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AUGUST 1986

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DATA STATEMENTS

Soft in the Head

THE SOFTWARE MARKET IS NOW ENTERING the quiet season of the year, but having said that, there are still a lot of interesting products finding their way to the shelves of your local computer store.

Going Cheap

BUDGET SOFTWARE IS ON THE UP and up. Firebird has recently been proud to announce that it is the first software company to have its products simultaneously at number one in the UK (Gallup) and the Stern (Billboard).

The two products which helped to achieve this accolade are *Phruze*, a game in the Firebird silver range, and the now famous title, *Ollo* which has at last made it to the top in the UK at the reasonable price of a mere \$29.95.

Firebird has now announced a new set of budget titles, which, it is claimed, "are available to every confectioner and renaissance in the country". These include one game for the C64/C16, *Caves of Eldor*, and two for the C-16, *Runner* and *Shark*.

Another Firebird offer is the Silver Club, which enables you to purchase a £1.99 game of your choice and with it you receive a package of goodies and a newsletter.

Not to be outdone, Mastertronic is releasing some new games for Commodore machines.

In the £1.99 range are two titles. Firstly, a volleyball simulation entitled, *Bump Set Spike - Double Volleyball*. Attributes of the game include crowd applause, professionally composed music, choice of courts (beach or indoor) and nine difficulty levels.

Those who are interested in sampling the high life of the professional gambler may like to go for *Vegas Poker*, also £1.99 and for the C64.

Two titles now available on Mastertronic's £2.99 MAD label are *Cowdolls* to *Midtown* and *Ice Palace*. The former involves the now tragic scenario of an accident at a nuclear power plant and the latter enters the land of fairy tales to bring you face to face with the wicked Ice Queen.

ORL's budget label, Alpha-Omega, has recently launched a new Commodore title, *Jet Strike Mission*. The game is a combat flight simulator where your task is to avoid enemy air and ground attacks and seek out and destroy the target. The price is £4.95. Yes, it is on the budget label.

Out of the Arcades



A NEW VERSION OF POPEYE, THE computer game, has been released at £7.95 by Macmillan Software. The game, which has the classic situations which the spinach-munching hero daily encounters in his attempts to protect his rather intellectual girlfriend Olive.

Popeye has recently returned to the public eye on TV-AM every day and Moolenaar is about to launch a new range of Popeye clothes. If you want to join in this new exciting craze maybe you'd better get the game too! Surprisingly entitled *I Am Mihal I Am*.

Bug-Bits, now under the wings of Argus-Press Software, has begun importing software from down under for release in this country. Cilla's and *U - Five Million* and *Final Assault* is the title of the Aussie game and was in the Top Ten in its home country.

Claims made by Bug Bits for the game are as follows: stunning graphics and sound, two games in one with four separate sections each, and a ridiculous level of addiction.

Les Aventures!



FOREIGN SOFTWARE IS ALSO ARRIVING from across the channel. Infogames, a big French software house is soon to release *Massagone*. The date for launch is, significantly, 14 July, Bastille Day.

The *Massagone* package includes two cassettes to accommodate the 2600 program, an instruction book and a 18 chapter book of hints and tips. It's a role playing graphic adventure and there are hints of a trip to the south of France for a few lucky players. Look out for more details.

NELIS the much heralded arcade adventure finds new software homes. NELIS is now available for the C64. At a cost of £9.95, it involves you in an attempt to crack an evil drugs ring. Only the NELIS team can supply you with the information you need to complete your mission.

A new scenario for a computer game comes from Arkispace with the release of *Standing Stones* on the C64. This is a new graphic adventure set at Stone Henge, where you must uncover the Cast, Mitchell Chain Mail and other fabulous treasures from ancient folklore. The treasures lie hidden deep beneath the ancient monument. It's £16.95 on disk.

The long awaited Japanese adventure from Virgin, *Shogun*, has now been released and Virgin hopes it will do as well as the book and TV series which preceded it.

The game is check-a-block with 40 characters and you may choose which one you wish to be. Each one has a personality and life of its own and you must learn to manipulate them. *Shogun* is £9.95 on cassette and £12.95 on disk.



Touch Line

Flashdisk: Wellington House, Upper St Martin's Lane, London WC2H 9DL, 01 379 4751.

Masterbooks: 6-18 Fox Rd, London EC2A 4HL, 01 377 5369.

Alpha-Dynaps: 9 Kings Yard, Corporation's Rd, London E15 2SD, 01 885 5407.

Macmillan Software: 4 Link Lane West, London WC2R 3JF, 01 858 6611.

Box Bytes: Liberty House, 222 Regent Street, London W1B 7DB, 01 479 8666.

MIDCOM: 128 Mount, 30 High St, Berkeley, CA 947 143, 01 658 5211.

Aristonsoft: 46 Long Acres, Covent Garden, London, 01 836 1471.

Virgin Games: 2-4 Norton Yard, Portobello Road, London W11 2BA, 01 737 8073.

But Seriously

OPERATION ALIGNMENT, FROM Global Software, is an offspring of Operation Cartridge, a product released last year. The new package contains just the alignment tape and screwdriver for adjusting tape heads and is a smaller unit. The price is smaller too at £5.95.

Kuma Computers is entering the Amiga software market with an Editor/Assembler/Debugger entitled K-Jetka.

The package includes an Editor, Disassembler, Linker and Machine Code Monitor and operates under Amiga DOS.

K-Jetka is available now and costs £79.95.



Touch Line

Global Software: PO Box 67, London SW15 1BS, 01 226 1345.

Kuma: 51 Hornchurch Park, Pangbourne, Berks, 07357 4031.

And the Rest

ACTIVISION HAS WANDERED INTO the world of psychology to give you the chance to live out your life over and over again - how horrific!

The new game is called *Alive* and it delves into every aspect of your life, from birth to old age. The program processes and tracks the player's input to develop the alter ego's experiences, status and personality.

A status report shows the player which type of responses influence his alter ego's skills in several areas: social, intellectual, emotional, physical, familial and vocational.

Because of the nature of the program there are different male and female versions.

There is also a warning which comes with the game. Because of the nature of some of the material used it is unsuitable

for under 16s and PARENTAL DISCRETION is advised.

Have you a little Vic sitting in the cupboard under the stairs and not hearing don't tell, now it's time to let it see the light of day again!

Microsoft has come to the aid of languishing Vic-20 owners with the *Vic* collection. Games such as *Abolition*, *Crisisrunner*, *Traxx*, *Amiga Attack*, *Castro*, *Aladdin*, *Metagolistic* *Demons* battle at the edge of time and hellgate.

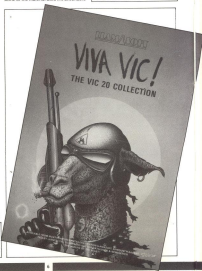
It is now available in 8K or 16K

version and costs £8.50.

Touch Line

Activision: 21 Ford Street, Hampton, London HA9 2PH, 01 455 1181.

Microsoft: 40 Vincent Square, Teddley, Middx, 07156 4478.



Hard Lines

MICROTEXT HAS COME UP WITH A telnet adapter for the Citi or T28 so that users can access the hundreds of free telnet pages available 24 hours a day on all four UK channels.

It is suitable for use throughout Europe (except France) and Australia and New Zealand. The free pages which can be accessed using this adapter include news, finance, sport and history. Any page can be saved to disk and reprinted later.

For the overall price of £85.95 the adapter is supplied plus a connecting lead, software on cassette and a manual. There is a 12 month guarantee on the package and the software is unprotected so backup copies can be made.

Miracle Technology's 64 Multimodem has now received British Telecom approval.

The new modem is micro-driven and multi-speed. It supports CCITT V21/22 and Bell standards, handles baud rates of 300/300, 1200/75 and 75/1200. This allows access to Prestel, Microtext and Microlink and numerous rimlink services and bulletin boards. It costs £268.50 (£116.15 including VAT and UK delivery).



Touch Line

Micromods 2 Beldip Place, Harmondsworth, Bucks PO8 8PL. 0295 596648.

Miracle Technology 15 Peters Street, Ipswich IP1 1GB. 0473 290471.

Generally Speaking

A EUROPE HAS GROWN UP IN THE tape manufacturing industry over government plans to introduce a tape levy on blank audio cassettes.

Christopher Hobbs, Chairman of the Tape Manufacturers Group said it would be "an administrative nightmare based in expensive red tape perforated with legal loopholes".

The group has issued a whole list of objections on behalf of the manufacturers. They state that home taping doesn't damage copyright owners' incomes, that no distribution of the money realised by the government levy could be fair. The levy would inflate the price of tapes and the administration to collect money raised in this way would be cumbersome. The rebate system would also penalise the disadvantaged, such as the blind, because it would not include distributors and retailers mark-ups. There is also a possibility that the levy is illegal under EC law.

The Consumers Association has also come out against the government in this issue saying that the levy on blank audio cassettes is a "typical example of producer muscle".

Rosemary McRoberts of the Consumers Association said: "Ordinary customers who buy blank tapes are not playing on counterfeiters, and they don't make dozens of copies of copyright performances."

Yellow Pool

BRITISH TELECOM IS TO introduce an electronic version of the Yellow Pages Directories. Information on advertisers will be held on a central database accessible to anyone with a suitable communication terminal.

Initially, the Electronic Yellow Pages (EYP) will contain information covering the London, Reading and Guildford areas.

Richard Hooper, of BT's Value Added Systems and Services Division said: "Electronic Yellow Pages will be a valuable addition to our growing range of electronic publishing products. EYP will not be a substitute for the printed book, but, as an extension of it, will

allow Yellow Pages advertisers to meet a real market need by adding up-to-the-minute information to their advertising.

The new service will be launched in January 1987.

Touch Line

Consumers' Association 14 Backingham Street, London WC2H 8JG. 01 539 7122.

The Tape Manufacturers Group Aspect PB, 17-19 Foley Street, London W1P 1JL. 01 580 8074.

British Telecom 11 Newgate Street, London EC1A 7AL.

DATA STATEMENTS

Stop Press

IN A NEWS ITEM IN OUR JUNE 1986 issue, we stated that Arkissoft was giving prizes to 12 people who achieved a benchmark of zero in Golf Construction Set. In fact, there is only one prize which will be awarded to the first person to achieve this amazing feat. We would like to apologise for any confusion caused by this error.

Also in the June 1986 issue, we published the wrong address with our article 'Cautiously Speaking', which reviewed the Valcom 64 package. The product is from CRI - not Arkissoft - and can be obtained for £4.95 from CRI, 4 Kings Yard, Capenhurst Road, London E15 2JG. Tel: 01 913 2978.

COMPETITION

This month we bring you a

musical competition from

Nu-Wave.

REMEMBER MIKE OLDFIELD'S CLASSIC album, *Tubular Bells*? It was a rock in the seventies and now Nu-Wave Software has introduced it to the computer era with an alternative style of software.

Nu-Wave's *Tubular Bells* program features the entire soundtrack of the original album plus graphics which keep time to the music and also compliment it.

We have a top prize of a copy of *Tubular Bells*, the album, signed by Mike Oldfield, plus *Tubular Bells*, the video and *Tubular Bells*, the computer program. The top prizewinner will receive all of these.

There are also 25 runners up prizes of copies of the Nu-Wave program.

How to Enter

We want you to show us your knowledge of popular music by naming a maximum of seven song titles which feature the names of the days of the week. You should have one song title per day.

For example, if you think there is a song called 'You only love me on Mondays', then write this in the space provided on the entry form and go on to Tuesday. There may be a song called 'Tuesday Girl', if there is then this could be your answer for Tuesday. Continue until you have thought of as many as you can, remembering that we only want ONE for each different day.

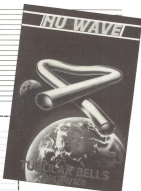
When you have completed this, fill in the rest of the entry coupon and seal it in an envelope. Write the number of titles you thought of on the back of your envelope. You may enter as many times as you wish but each entry must be sealed in a separate envelope and an original entry coupon not a copy.

The closing date is Friday, 26 August 1988. Send your entry to: Nu-Wave Competition, Your Commodore, 1 Golden Square, London W1R 3AB.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications, CRL and Alabaster Partners and Sons. This restriction also applies to employees' families and agents of the company.

The final no Enter section forms part of the rules. The editor's decision is final and no correspondence will be entered into.



Nu-Wave Competition Entry Coupon

Name

Address

post code

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Tuesday Song

Wednesday Song

Thursday Song

Friday Song

Saturday Song

Sunday Song

Send your entry to: Nu-Wave Competition, Your Commodore, 1 Golden Square, London W1R 3AB. Closing date: Friday, 26 August 1988.

BUG-BYTE



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HOOOOO VOOOOO

Defeat the Bloopallop cult of Krellis II, amazing graphics.



SOLO

Fast and furious action. The Battlegoons are coming



RUPERT

Lots of slippery fun with Rupert's charm. 4* review (C.C.).



LEAPER

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Selected titles are available at W H Smiths and all good computer stores

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address, to Autodesk, P.O. Box 401, London W9 1JH).

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(Cassette £9.95)





Eric Doyle takes a look at Microsoft's new game — Biggles.

BIGGLES HAS BEEN THE HERO OF many children down the years and, with the advent of the movie, Microsoft has released the computer game.

Biggles is a flying ace who gets into all sorts of scrapes with his friends Algy, Bertie and Ginger. In the film story, several new characters are introduced including the beautiful double agent Maria.

The computer program is heavily based on the film. It comes in two parts: *Time warp* and *Sound Weapons*. *Time warp* must be completed first if you want to start a chance of destroying the *Sound Weapons* in part two.

Time warp is really three games in one. Biggles appears in a biplane shooting down enemy fighters in 1910. He can then warp into present day London and then back to ground combat in 1917.

Biggles in the Air sees our hero burst by enemy planes and flak. He can fire his cannon at the planes or drop bombs on the carriers but his bombs are limited. You always have to keep one bomb in reserve to hit an enemy arsenal which replenishes your supply. Manipulating the plane to avoid the enemy fire becomes quite tricky, especially when an enemy plane is circling in on you. At any time a flash of lightning can indicate you have entered one of the war zones where you are hit by enemy fire. When you drop you lose a life and the game ends.

Biggles' London mission is over here and his dog, two men are stranded on the rooftop of London. The early escapes to keep the men building to building, avoiding enemy cars and gunfire. Only one of the men can be moved at a time, the other waits until his turn to move. At all times both characters must be on the screen. The strategy is to take a long run up and jump across to the next building, avoiding the patrolling guards. Then find somewhere

safe for the character to wait while you bring his twin across.

This is not an easy task especially when a sniper starts shooting from a nearby window. Once again time warp will blast you out of this scenario.

In *Biggles* on the battlefield you may think for a moment that you've stepped into a game of *Commando*. You haven't, but the rules are similar. Shoot all the guards and throw hand grenades at the pill boxes to silence the guns. Biggles has little room to dodge about in and he has to be cloaked into one of the many caves to retreat with grenades when his supply runs out.

As a guide to your success rate three icons are shown at the bottom of the screen. Each time you fail and lose a power of lives disappears. If an icon vanishes you must start again.

If all three games are completed in the correct order, the flight school in London, you are given a helicopter to start the second part of the game.

The *Sound Weapons* is a helicopter flight simulator but don't let that worry you. The controls are simple and the graphics with the scrolling give added realism to the game.

Before entering the *Sound Weapons* you have to perform certain tasks. One of these is to pick up a radio which is in the allied camp and use it safely to the convent. Flying the helicopter requires good practice at steering the helicopter using the radar and compass to keep on the correct bearing.

The radar has two modes of operation. In long range mode it shows the sector you are currently in and the type of enemy you may encounter. Scouting areas of heavy enemy infiltration is advisable until you are sure of your combat capabilities. Other areas may also have enemy planes which could prove costly.

The hints and tips given for this section are invaluable otherwise you could be wandering across the extensive mapped area for a lifetime. You are told to examine the north west corner carefully before heading for the convent,

extra fuel and Biggles' friends are somewhere around here so the hint is worth taking because without these the mission will fail. Each friend has a particular skill or ability. For example, one of the team is good at repairing the helicopter and should prove invaluable when the fuel is really low.

Eventually you will locate the weapon's and must complete your mission by destroying it.

Recent games of this type have been disappointing. At the best but this one gives an almost sense of the movie's atmosphere. When playing the game, the *Time warp* extremely good. Just when you think you've mastered the correct method of attack you find that you've boxed yourself in with no hope of escape. Sometimes it is a lack of bombs or grenades, another time it will be a patrolling rooftop guard or a short run up for a long jump that ends your life and sends you off into another scene.

The graphics are not the best I've seen but certainly nothing to complain about. *Workward* like is the best description.

The program is accompanied throughout by music. No facility is available to switch the music off but at least it's not too irritating. Produced by Tony Croxson's little team, the music is good. The Rose Hubbard is in danger of losing his crown in the near future.

When reviewing a game I like to play through as far as possible. Unfortunately the fact that you need to complete the first part before standing a good chance of completing the second game means that I only really viewed the *Sound Weapons* scene as a tourist rather than as a combatant but I must say I was impressed with what I saw, even if it did resemble a poor man's *Firefox*.

When a game offers as many challenges as this one does it would be impossible to say that it lacked appeal. This is one of those packages with something for almost everyone and should not be ignored. If you have any doubts don't ignore the game try to find a copy and give it a whirl.

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P.S. We are also looking for 6502/280 programmers for urgent conversion work.

★ STAR QUALITY ★

Eric Doyle gives his verdict on the Star NL-10 printer

PRINTERS ARE A PAIN IN THE NECK. They are complicated contraptions, called letters on the Commodore printers do not descend below this line, other printers need interfaces, which means more spaghetti trailing out the back of my computer, and the printers look like a monochrome attack of the measles. If you've ever voiced any of these reasons for not buying a printer, Star Micros has most have been listening because the NL-10 printer goes a long way to eliminating them.

First and foremost, the printer is available with a Commodore interface which fits neatly and easily into a recess in the back of the printer so you don't spoil its very nice appearance. Connection to your Commodore is via

the usual standard DIN lead and the interface has two sockets to allow daisy chaining to other peripherals such as a disk drive. A secondary benefit of this is that if Commodore ever changes to a new printer operating system, Star can produce a new interface module to match and save you the expense of buying a new printer.

The interface allows you to select PETSCII code (Commodore's character numbering system) or ASCII code at will. This can involve typing a code such as:

```
PRINT $+CHR$(27)+CHR$(96)+CHR$(99)
```

Just thought I'd show that to be polite to you. Star does not totally get away from the CHRS/CHR\$ graphics but some of the standard printer features can be changed either by the usual array of DIP switches or by skillful use of the display switches on the front of the printer.

Switched On

The DIP switches are easily accessed at the back of the printer but I don't see why DIPs are so loved by the majority of printer manufacturers. They're so small that you have to use the tip of a ballpoint pen or a small screwdriver to flip them. Admittedly, a three year old child could use them but my fingers are substantially thicker than that. In a business environment these switches would normally only be set once but I have to use them a lot in my work and they really are a nuisance. My own theory is that a part has been made with ballpoint pen manufacturers to offset the unemployment that wordprocessors may create in their industry.

The switches are set in a bank of eight allowing or negating auto line-feed and paper-out detection, or for setting a standard page length, device number plus ASCII/Commodore mode. Several

THIS IS THE NL0 TYPEFACE

THIS IS THE STANDARD DRAFT PRINT WITH UNDERLINING

THIS LINE IS DOWNS PITCH

THIS LINE IS IN ELITE PITCH

THIS LINE IS IN NORMAL PICA PITCH

THIS SHOWS PROPORTIONAL SPACING

EXPANDED CHARACTERS

BOLDFACE

EMPHASIZED

EMPHASIZED BOLDFACE

EITHER SUPERSCRIPTS OR SUBSCRIPTS IF YOU PREFER

ROMAN CHARACTERS OR ITALICS

DOUBLE QUAD SIZED PRINTING

foreign character sets can also be selected using a combination of those of the switches.

The front panel selections are used singly or in combination to allow swift access to various useful printer modes. By holding down the relevant key when you switch on, you can initiate a printer test, start up in NLQ italic mode or switch the computer into hex dump mode.

NLQ stands for Near Letter Quality which means that the printer takes two passes to print a line but the quality is very close to that achieved by a typewriter or daisy-wheel printer instead of the lower quality achieved by straight forward single pass printing (draft mode).

The hex dump mode is very useful for checking the output from your computer to the printer. Instead of the usual row of characters the printer gives the information in row hexadecimal numbers. It is also a quick way of doing a memory dump for machine code programming purposes.

Now that I've actually reached the point where the printer is turned on we can invent (perhaps) other special features of the NL-90.

Features

The front panel switches can now be used to carefully align the top of the paper (TGH) with the printer head and

set the right and left margins.

The ability to set margins does rather spoil the neat feature on the panel which allows you to select the number of characters per line. These figures are specified for the default width of the printed line and are measured in characters per line (CPL). If you set margins to anything other than their default values, then the maximum value of CPL alters too. I would like to see the measure of characters per inch (CPI) listed alongside the CPL value instead of being hidden away at the back of the manual.

For the second the values of CPL given are 80, 96 and 128 in draft mode plus 80 in NLQ.

In addition to the normal pica width characters there are three other typographic styles: elite, condensed and the aforementioned italics. Bold, expanded, emphasised, underlined, double and quadruple height and width characters plus proportional spacing can also be produced. Of these only bold can be selected directly from the front panel. If this is not enough you can define your own characters for special purposes.

Defining characters is the strong point of matrix printers over daisy-wheel because it allows the dumping of high resolution screens on to paper. Doing this does involve an extensive amount of programming and for most people it would be beyond their

abilities. Nearly all commercial sketch pad programs have a screen dump facility, however, and magazines have often published them in the past. Most of these utilities are designed for Epson printers but because of the compatibility of this machine with the Epson standard most routines will be usable with the NL-90.

Using the machine has proved to be a delight. Spocket wheels allow the use of tractor drive paper and a friction platen will pull normal sheets of paper through. This means that it is ideal for business or private use. There is a selector switch to the right of the platen which determines the paper feed mode and for the adventurous a sheet paper hopper for auto-feed is included.

Although Star has gone a very long way towards user friendliness, the company has failed to take advantage of the capabilities which its machine specific interface allows. All of the CPMS codes could have been replaced with simpler, user-friendly commands. Perhaps in future models this will be rectified, after all we're not a nation of computer buffs. Compared to the opposition, this machine is either more advanced or cheaper and offers great value for money.

The greatest facility which the NL-90 sports is the NLQ option. No more will I have spots before my eyes after a long printing session.

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WELCOME TO THE MACHINE

Allen Webb on the complexities of machine code.

First a little snippet of news. I hear that Ocean has bought out a new assembler system—Laser Genius. The company tells me that the assembler part is the same as *White Lightning* but there is a new feature— an analyzer is included. Apparently this allows you to set intelligent break points and, on breaking, examine the previous instructions. It certainly sounds like the answer to many problems.

The BIT Instruction

There is a handy instruction called BIT which performs a logical AND (see later this part) of a memory location and the accumulator. As usual this is non-destructive. If the result of the AND is zero, the zero flag is cleared; otherwise it is set. Additionally, the overflow and negative flags are set according to the value of bits six and seven of the memory location. Listing 1 gives a way of generating a non-destructive counter using BIT.

Listing 1

```
10 ASSEMBLE $U1
20 $104 = $C000
30 $104 LDCPI BIT $0400
40 $104 BNE LDCPI
50 $104 LDA $0400
60 $104 DBA $73B
70 $104 STA $0400
80 $104 JMP DELAY
90 $104 LDCPI LDA $0400
100 $104 AND $737
110 $104 STA $0400
120 $104 DELAY LDB $B
130 $104 DBA $737 LDB $700
140 $104 DELAY1 DBY
150 $104 BNE DELAY1
160 $104 DBY
170 $104 BNE DELAY1
180 $104 JMP LOOP
190 $104 ]
```

This routine is rather convoluted but illustrates one way of using BIT to monitor bit seven of a single memory

location. In this case, the top left corner of the screen, since BIT functions only in absolute and zero page, if we're really suited to perform this function for the whole screen unless you load the current cursor position by indirect indexing into a memory location and BIT that.

Line 100 copies the value of bit seven of the contents of location \$0400 into the negative flag. It happens that this bit is used to show whether or not the character on the screen is normal or reversed field. If bit seven is set (reversed field character), the program branches to line 140 where the bit is cleared (see 170) clearing this. Otherwise line 100 sets the bit. Lines 160 to 240 perform a simple delay.

You will notice that lines 100 to 170 are some new instructions. These are some of the logical or Boolean instructions (see various rules to allow the combination of bit patterns. These are used in a variety of ways.

The *lra* instruction is AND. This instruction follows the following truth table:

A	1	0
0	0	0
1	1	0

Using this table if AND two set bits, the result is a set bit. All other combinations result in a zero bit. Imagine that you want to ensure that a location never holds more than 15. The following sequence will ensure this:

LDA number
AND 15
STA location

If the accumulator contains binary 111001010, this sequence will have this effect:

111001010 AND 00001111 =
00001010

We have effectively masked out the top four bits. Hence by using AND we can selectively remove or retain bits.

Line 170 in Listing 1 clears bit seven by ANDing with 127 (0011111111). The next instruction is the exclusive OR. This has the truth table:

A	1	0
0	1	1
1	0	0

In effect, if either bit is set, the result is a set bit. OR allows the selective setting of bits. Line 180 in Listing 1 sets bit seven by ORing with 128 (010000000).

Finally we have the exclusive OR (XOR):

A	1	0
0	1	0
1	0	1

This instruction can be used as a comparison tool since dissimilar bits result in a set bit. It can also be used to complement or invert a bit pattern. Consider the effect on:

11011011 001 10110111 =
100100100

This effect is very handy in graphics to obtain reverse field effects.

Summing It Up

Last time I was very friendly in my dealing with arithmetic. Things are in fact a little more involved than I indicated but I didn't want to put you off there. Now, unfortunately, we have to look at things a little greater detail.

The rules for adding binary are quite simple. Two zero bits when added result in a zero bit. Adding a zero bit to a set bit results in a set bit. Adding two set bits results in a zero bit and a set carry. The following examples will show what I mean:

0010 +	0011 +
0100	0001
0110	0001

I've already mentioned that bit seven is the sign flag. When happens, therefore, if your addition gives a result with a set seventh bit! Clearly this is incorrect since we've generated a negative number. The answer to this action results in an overflow which sets the V flag. Here is an example:

```
10001100+
10000000
10001100
```

The overflow flag is set when there is a carry from bit six to both seven and can occur in one of four situations:

- When large positive numbers are added.
- When large negative numbers are added.
- When a large positive number is subtracted from a large negative number.
- When a large negative number is subtracted from a large positive number.

Clearly, you must make allowances in your coding to check for overflow if you are using signed arithmetic.

In signed binary, bit seven is set to denote a negative number. Consider this example in which we try to add +8 to -1:

```
+8 ..... 00001000 +
-1 ..... 10000011
..... 10001011
```

The result is -11, which is clearly incorrect. There is a bug in adding binary this way. The solution is to use the concept of two complements to represent negative numbers. To get the two complement, you invert each bit and then add one. Here are two examples:

```
1 = 00000001
invert the bits 11111110
```

```
add 1: 11110111 -5
8 = 00001000
invert the bits: 11110111
add 1: 11110111 -8
Let us go back to our earlier
example but using two
complements:
+8...00001000+
-3...11111100
00000100
```

The answer is five as required. We ignore the carry flag. Using two complementing, we can add or subtract signed binary numbers at will. It won't take much thought to realize that subtraction is simply the addition of a number to the two's complement of the other.

These comments will be of most value to those of you who wish to manipulate real data rather than playing games. If that is your goal, then further reading from a standard text, such as *Z80*, is mandatory.

Those of you who have used electronic measuring equipment, may have come across Binary Coded Decimal (BCD). This is a frequently used format for data transmission. The 8080/8085 allow you to use BCD. To enter decimal mode, you must set the Decimal flag with the instruction SED. To return to binary mode, you clear the flag with CLD. In decimal mode, a byte is used to hold two four bit coded numbers. These are:

CODE	BCD DIGIT
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9

Consider a location holding the bit pattern 01100010. In binary mode it contains 34. In decimal mode it contains:

```
0010 0001
or 21
```

The reason is that the left nibble contains the 10 coded

as above and the right nibble contains the units. Try listing 1:

Listing 3

```
10 ASSEMBLE 901
100 R1M4 *+C000
100 R0M4 S0D
110 R0M4 CLC
120 R0M4 LDA 900
130 R0M4 ADCA 901
140 R0M4 STA 902
170 R0M4 CDD
180 R0M4 R0T
190 R0M4 ]
```

Try running the routine both in decimal mode and in binary mode (by erasing line 901). If you try with a value of six in each of 900 and 901, i.e. you are adding six and six, you should get 12 in binary mode and 16 in decimal mode. The reason is that the result of adding six and six is put into 902 as the two nibbles representing six and two.

0001	0010
1	2

When you peak 902, however, you get 18 since 18 in binary is 00010010. Try some other combinations of numbers. Never forget to include the CLD instruction before you return to basic since failure to do this will cause a crash.

BCD can also be of use when calculating scores in games without recourse to floating point.

The Stack

I have previously mentioned an area of memory called the stack. It might be a good idea if we finish this time with a few paragraphs on this topic.

The stack is essentially a scratch pad which the microprocessor uses to remember things, for example, when the processor executes a jump subroutines instruction, it must somehow remember where to return to at the end of the subroutines. It therefore saves details of the return address on the stack. The size of the stack is limited which explains why you are limited in the number of nested

CALLs/RJs you may have in Basic.

Not only is the stack useful to the machine, it is also useful to you. It is a simple matter to temporarily push data on to and pull data off the stack. Four instructions perform such tasks: PSHC: pushes the accumulator content on to the stack. PLA: pulls the next stack value into the accumulator. PSHF: pushes the status register on to the stack. PLF: pulls the next stack value into the status register.

The current value on the stack is monitored in a eight bit register called the stack pointer. It is often handy to save or alter this pointer. Two instructions allow this: TSS: transfer stack pointer to S register. RSS: transfer S register to the stack pointer.

One word of warning. You must take care to balance you push and pull instructions and monitor how you change the stack pointer. If not, you may end up with a nasty crash.

Homework

You may find these problems a bit more challenging.

- 1) Write a routine to place a character at a specified location on the screen. (Hint: If X is the horizontal position (1 to 40), and Y is the vertical position (1 to 25), then the memory location occupied by the character is given by $LCR=1024+(Y-1)*40+X$.)
- 2) When plotting high resolution graphics, a new point is created by ORing the relevant memory byte with a mask corresponding to the point to be set. This mask is equal to two raised to the power of the bit number corresponding to the position of the point in the memory byte. Why?
- 3) Running on from question 2, the following sequence of code will set the bit whose value is in the S register and the memory location to be masked is held in M0 and SPC:


```
LDH 00
LDH 01
```

```
LEA 00HLY
ORA TABLE
STA 00HLY
RTS
TABLE, BYTE 11,40,6,10,6,10,6
```

Write a similar routine which will erase a specified point. If you're unsure about how high resolution graphics work, try reading the *Commodore 64 Programmer's Reference Guide*.

The Answers

Last month we started an simple 76 bit arithmetic. The homework should help reinforce the material discussed.

The first question was a bit of a trick question. To multiply an eight bit number by 256, you simply move the eight bit number into the most significant byte of a 16 bit number and zero its least significant byte.

Question 2 is a frequently met situation where you're handling data on the screen and you want to move down a line. Here is my solution:

```
10 ASSEMBLE 901
100 R1M4 *+C000
100 R0M4 CLC
110 R0M4 LDA 900
120 R0M4 R0C 040
130 R0M4 STA 900
140 R0M4 R0C 001
150 R0M4 INC 901
160 R0M4 J0T1: R0T
170 R0M4 ]
```

The third example was simply included to make you think a bit. This solution is the nearest I can come up with:

```
10 ASSEMBLE 901
100 R1M4 *+C000
100 R0M4 CLC
110 R0M4 ANI 900
120 R0M4 R0C 901
130 R0M4 L0A 905
140 R0M4 R0C 902
150 R0M4 CLC
160 R0M4 LDA 900
170 R0M4 ADC 902
180 R0M4 STA 904
190 R0M4 LDA 901
200 R0M4 ADC 903
210 R0M4 STA 905
220 R0M4 R0T
230 R0M4 ]
```

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Figure 6

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Abstract

THE PLANNING

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Abstract

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Title:
The Anatomy of the Commodore 128

Author:
K Gerbs, J Scheib & F Thrus
Publisher:
First Publishing Ltd
Price: £12.95

SUCH A DETAILED BOOK AS THIS OFFERS takes many months to clear all of the copyright problems, which precede its release. It's immensely pleasing to see the C128 laid bare to the enquiring mind so soon after the machine's UK release.

The book is in two principal sections: a long and detailed look at accessing the facilities offered by the computer and a full disassembly of the ROM routines.

Although the book goes into depth on the 128 mode, the C124 mode is a little more sketchy and 64 mode is virtually ignored. This is not really a criticism of the book, after all the C64 is well documented already and the CPM section does give enough detail on the Commodore CPM to allow a general book on CPM to take over.

The first chapters deal with 128 programming for the informed user. No long duplications of Commodore's introduction to Basic here, it's right in to the control programs for the Memory Management Unit, 80-column high resolution screen, accessing the Kernel routines and much more more.

Each chapter is dedicated to an individual chip (including the 280 and 8563 video chips) and technical specifications are revealed alongside the more digestible hints, tips and

programs.

The ROM disassembly is highly detailed with a short description accompanying each line of code so that the reader can easily determine just what the ROM is up to at any particular point.

If you're serious about your 128 you can't do better than this impressive tome.

Title:
Tricks and Tips for the C-128
Author:
T Welton, R Hornig, J Trapp
Publisher:
First Publishing Ltd
Price:
£12.95

SOUL OF THE CONTENTS OF This book are duplicated in the Anatomy of the Commodore 128 but in no way does it destroy the value of either. Tricks and Tips is aimed more at the intermediate programmer than the advanced user but, as an introduction to the hidden abilities of the machine and as an aid to fledgling machine code programmers, looking for something to do with their new found knowledge, it has no peers.

The large typeface used throughout the book could be described in kinder moments as a useful concession to disabled readers who gain a lot of pleasure and practical help from their computer. If I want to be wicked, I would say that it uses more paper and makes the book look as thick as its companion books thereby justifying the

cover price, but I wouldn't be that nasty.

The routines given, range from simple software protection on disk and tape, interrupt drivers music, graphics routines, sprite and character generation, multiple windows and the MMU. There is even a section on adding extra commands to Basic. For those showing their hands up in horror typing that there are enough 128 commands for even the most discerning programmer, buy this book you'll definitely benefit from it!

Many of the smaller tips are little gems which would take months to unravel if this book was not in your library. The book fully describes all of the techniques used in clear concise English (the authors are German) and it should provide hours of fascinating study.

Title:
Commodore 64/128 Graphics and Sound Programming
Author:
Sam Krutz
Publisher:
EAB Books Inc.

DON'T BE FOOLED BY THE TITLE, THIS book is solely for the C64 or the 128 in 64 mode. Although this title looks good on the cover, I think it will put off more buyers than it attracts. C64 owners may gaze in awe with a wistful glance thinking that half of the book will prove irrelevant to their machine.

Kicking off with sprite programming, the book soon advances to moving the shapes around the screen and overlay animation techniques in unicolour and multicolour. The author then moves on to deal with character graphics in a similar way and then we have an elementary high resolution chapter. The listings, and there are an awful lot of them, are in Basic, very clearly printed and they work slowly.

The audio section deals with the shaping of musical sounds and sound effects. There are a few really good notes in amongst this lot. One criticism I will make is that a sample program using machine code interrupts would have stood quite nicely in with the sample machine code program at the end of the book.

The final section puts it all together,

BOOKS



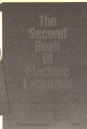
sound and graphics in synchrony, the sample program is especially synchronic, it's a full program. Two structures take turns dropping from a rightmost on to a leftmost, catapulting the other back up to the back. Surely a small sample game could have been developed from this!

The appendices give grids and programming aids, which are the best thing this book has to offer.

Title: The Second Book of Machine Language
Author: Richard Atanfield
Publisher: Computer! Books/Holt Saunders
Price: £12.95

IF MACHINE LANGUAGE FOR BEGINNERS was an introduction to the vocabulary of machine code, then this book is an essay on the grammar of the language. More than this, working through the book gradually builds up a powerful assembler program which not only teaches the basics of machine code programming structure but also acts as a useful addition to your utility library for creating your own routines and programs.

As the name suggests, the Label Assembler Development System (LADS) allows the use of labels and comments within a program which looks like a normal Basic program except that it uses its own mnemonic language based on normal machine code mnemonics.



This forms a much-easier way to construct a machine code program and not being in code itself means that it can be used to show many of the facets of programming including communicating with peripheral devices and maintaining a database.

The book is written in intelligent English which assumes nothing more than a bit of common sense and perseverance on the part of the reader. Perseverance comes in useful because you have to enter several pages of data which lacks the customary checkmarks/feedback of other books in the Computer! series.

An appendix of useful subroutines for incrementing, adding and subtracting double byte numbers, multi-byte addition and multiplication and division adequately cover areas which can be problematic to beginners.

Undoubtedly, the contents of this book offers great value for money to anyone interested in a good introduction to machine language.

Title: Tool Kit: Kernel
Author: Dan Heeb
Publisher: Computer! Books/Holt Saunders
Price: £13.95

COMPUTER! GAZETTE is a BATTER (Dapper) American magazine which is a mine of information for Commodore, Apple and Atari users, and Computer!

books of abstracts for each machine are always good value for money.

Tool Kit: Kernel may sound like a collection of utility programs but it is a description of the K204 kernel routines at the end of the memories of the C64 and V15 38.

The book is not fully self-contained and Computer! Tool Kit: Basic, which deals with the Basic ROM, along with a full disassembly of the kernel memory would be a useful companion to help gain the full benefit from the wealth of information contained in this book.

Each chapter is a grouping of the various subroutines in 'family' groups. For example, all the tape I/O routines form a large chapter which not only describes the routines but explains the



way in which a tape file is structured. Other chapters deal in a similar way with interrupts and system reset, screens, serial I/O, RS-232 and principal kernel routines.

Apart from giving details of the subroutines and their relations, there is a smattering of hints and tips and short useful programs which demonstrate how the kernel may be used within your own projects.

The routines are listed in memory order and abbreviated groupings in two final appendices but a more standard index would have improved the facilities offered by this very useful book.

SHELF

Bookworm, Eric Doyle,
 delves between the covers
 of the best Commodore
 books.

MAKING

Stuart Cooke takes a look at

The Commodore Music

Expansion System

THE COMMODORE M4 IS WELL known for its musical capabilities. In fact the sound is so good that some companies are manufacturing audio copiers of computer music so that you can listen to computer music on your hi-fi!

Not satisfied with having a computer that has some of the best sound, Commodore, together with Intsil Sales, has gone even further and produced the Sound Expander.

The Expansion System consists of a small box which plugs into the cartridge port on either a Commodore 64 or 128. This small box will then give your Commodore the ability to play eight different notes at once together with a drum backing sound and numerous solos.

The Expansion System contains an FM Music Synthesis chip which produces all of the sounds. FM Synthesis is used in the very popular Yamaha DX7 synthesiser and gives your computer facilities very similar to these very expensive machines.

In Use

Obviously before you can use the interface you will have to put the sound through some sort of amplifier. Leads are provided with the interface so that you can put the sound through either a television or a monitor. The best sound reproduction is achieved by putting the sound through your hi-fi or a music amplifier, the sound output going from the interface to the AUX input on your hi-fi. The lead to do this is not included so you will have to buy your own.

Once the controlling software is loaded from either tape or disk you can make music.

The various options offered to you are chosen from pull down menus. The menus available are:

SETUP - which allows you to choose keyboard spins, single finger chords etc.
SYNTH - which allows you to choose

which of the preset voices you are going to use.

INTHRM - allows you to choose from one of the preset drum patterns.

RIFT - if less/beginners to play tunes and likes to draw music.

DRK - available only to people who buy the disk version of the software. This allows you to load in new sounds and new music.

Using these menus is very simple. Use functions F1 and F2 to select the option that you want, then press F7 to 'pull down the menu'. Once the menu is down use the same keys to move up and down the menu and select the appropriate function. The only problem that I found with this is that there is no quick escape option. The RIFT menu function is always at the top of the list, if you want to change something at the bottom of the list then you must go down make the necessary change and then go back up to the top again to leave the menu. Very time consuming.

As previously mentioned the Setup menu allows you to set many useful parameters. For example you can split the keyboard whenever you want and have one sound playing on the left hand keys while another plays the right hand keys. This means that you could play a tune with an organ sound while you play the chords with a guitar sound.

You can take this even further by using auto chords. This function allows beginners to play chords by simply pressing a key. For example to play C Major press the C key. Both major and minor keys are available but unfortunately there are no sevenths.

If you select one of the rhythms and you have any chording switched on, a backing track will automatically be added to the chords, this is great for beginners as they can play complete tunes with just two fingers, one for the tone the other for the chords.

The sounds offered from the SYNTH menu are pretty diverse and of exceptionally high quality. The voices range from a harpichord through to a jazz organ so there is probably something to suit just about every taste you are likely to play. Disk users have the added benefit that they can load in a second set of voices from disk.

The rhythm section is quite good though it sounds a little tinny. It would be possible to use the sound expander as a stage but on no account would you feel happy using the built in drum sounds.

If you have never touched a keyboard before you will love the RIFT option. When you choose this option each key has 'stored in it' a little tune. Pressing keys at random will link up to bits of these tunes together giving quite catchy tunes. Riffs that are available are Country, Pop and Disco. Disk users also have a big band sound option.

As I have previously stated, the interface allows you to play up to eight notes at once. The notes being played are represented on a musical scale on the screen. To actually play the notes you can either press keys on the keyboard, use an optional overlay as used with the Commodore Music Maker, or use an add-on keyboard.

The add-on keyboard is a five octave full size keyboard. It is fairly well made and has a very good 'feel' to it. People who are used to pianos and organs will be quite at home using it. If you are used to a piano it is worth pointing out that there is no touch sensitivity to the keyboard, no matter how hard you press a key the note will play at the same volume.

Obviously a product like this has to have some bad points and it does. However, most of my gripes are over the documentation and the software NOT the interface itself.

The manual can be described as fairly adequate. There is information on each of the functions available but there is no information on how to program the interface yourself. OK so it may be complicated but surely there are people who would like to give it a go. Commodore will be releasing a package that allows you to generate your own sounds at a later date but it has yet to be seen if this will let you generate new voices for use with the keyboard.

This shouldn't be too difficult for the disk system but since the cassette version doesn't have a UDAID option I'm fairly certain that you won't be able to change the voices on the cassette version of the software.

MUSIC

The RPT function is great fun but after a little while becomes a little boring, after all you wouldn't listen to the same record over and over again would you? My personal opinion is that the memory given over to this could have been used to offer a few more input options especially the option of more voices.

If you purchase the sound expander together with the full size keyboard then you will also get the Commodore Sound Studio thrown in. Being honest I can't quite understand why this program comes with the package as it is used for editing the OS's internal SID chip not the new sound chip.

The program basically gives you a synthesizer front panel and allows you to

change parameters such as attack and decay very simply as well as allowing you to write tunes. The program isn't really that bad my personal opinion is that it is the incorrect one to be packaged with the keyboard.

Verdict

The Commodore Sound Expander in whatever form you purchase it can only be described as superb. OK so I've mentioned a few dislikes but it's good qualities far outweigh those.

The keyboard and software reviewed here was seen by both professional musicians and people who have never touched a keyboard before, all were equally impressed.

If you are thinking of taking up playing keyboards or would like to own one but until now have been put off by the price, dig deep and go and buy one of the available systems, you're sure not to regret it.

Touch Line

Sound Expander plus full size keyboard \$149.99

Sound Expander plus Commodore 64 and keyboard £189.

Available from most Commodore Dealers.



'CHIP

**Eric Doyle crawls
inside his
Commodore to look
at some chips.**

A SMALL NUMBER CAN BE easily stored in a computer's memory but most programs use numbers which are outside the range of simple integers. Two byte integer values can only include whole numbers in the range of 32767 to -32768, so how does Basic deal with extremely large numbers or decimals?

The system used is known as floating point mathematics or scientific notation. In the decimal system of numbering any number can be expressed as a power of 10. For example, the number 10 is represented by $10 \div 10 = 1 \times 10$. One hundred becomes $10 \div 10$ which is $1 \times 10 \times 10$ and a thousand is $10 \div 10 \times 10 \times 10$.

Numbers between multiples are represented in the following ways:

$30 = 10 \div 10 (2 \times 10 \div 10)$
 $3.52 = 10 \div 10 (3.52 \times 10 \div 10)$
 $3.5278 \times 10 \div 10 (3.5278 \times 10 \div 10)$

You can see that converting a number to floating point format means dividing it repeatedly by 10 until the number is reduced to a value between one and nine. Then the number of divisions is written down as a power of 10. This process is called 'normalising' the number.

Values below one are normalised by multiplying them by 10 until the value lies in the range one to nine, as before. This time the number of multiplications are represented as a negative value of 10.

0.1 becomes $1 \times 10 \div 10$
 0.00521 becomes $5.21 \times 10 \div 10 \div 10$

In this form of notation 10 10 has the value of one, so any number from one to nine is represented by 10 10.

The two parts of the floating point number are known as the mantissa and the exponent. The mantissa is the fractional number and the exponent is the power of 10.

Because the power is always a power of 10 the computer uses the letter E instead of printing 10 every time:

1.248E10

By now you will realise that the decimal place is determined by the exponent. The name 'floating point' is derived from the fact that as the exponent is increased and decreased the decimal point floats upwards and backwards along the mantissa when the expression is converted to normal decimal notation.

Binary Power

This is all very well but there's a fly in the ointment. Computers use binary notation not decimal. Fortunately, the method is the same but to base two.

We have seen that normalising a decimal

number means converting the number so that it lies between one and 10 or, to put it another way, one and the number base 10 minus one. Applying this to binary base two, a normalised number lies between one and the number base two minus one. So a normalised binary number always has a one before the decimal point.

When reading a byte from left to right the value of each successive bit in decimal is half of the previous bit in the series 8, 4, 2, 1. This series continues beyond the decimal point as, since binary one is the lowest whole number in the series and it equals one decimal, binary 0.1 is 0.5 decimal, binary 0.01 is 0.25 and 0.001 gives decimal 0.125.

The exponent lies in the decimal range 127 to -128 but this does not convert directly from the binary bytes. Instead a binary value of 255 means that the number is also zero in decimal. A decimal value of one converts to a value of -128, two is -127 and so on until 126 converts to -127. It follows that a real value of 129 is equivalent to an exponent of zero.

Frying Mantissas

The mantissa is not as straightforward as it first might seem. The first byte assumes an imaginary decimal point following the highest bit of the byte. We have discovered that any normalised number has a value greater than one but

Decimal	Binary	Normalised	
1.8	1.8	1.80	$\times 2 \div 10$
2.5	2.5	1.81	$\times 2 \div 10$
0.0025	0.0001	1.80	$\times 25 \div 10$
3.375	101.011	1.89061	$\times 2 \div 10$

five bytes are used in memory to store floating point numbers. The first byte is the exponent and the following four bytes give the mantissa.

Just as two, so we can always assume that the highest bit of this byte will be one. Using this fact, the computer uses this bit to signify positive and negative



CHAT'

numbers. A one in this position would mean a negative number and a zero signifies a positive value.

If the stored values are **PIECED** an ordinary decimal value would result. Mantissa 1 would return a value of 182. To convert this to a mantissa value we must first evaluate the high bit by **ANDing** the location with 128. This gives 128 which means the bit is set and the number represented will be negative.

Next we must determine the value of the rest of the byte. **ANDing** with 127 will eliminate the first bit and give 64. This is the first decimal place of the binary mantissa and equates with a value of 0.5 decimal. The maximum value which it could reach if **PIECED** is 127. This is almost 128 which is double 64. If we divide our value by 128 we therefore get 0.5.

What if the third highest bit was set instead? **ANDing** with 127 would give 32 and dividing by 128 gives 0.25, so the system seems to work. This deals with Mantissa 1 and we now go on to consider Mantissa 2.

Imagine for the moment that this whole byte was an eight bit Mantissa 1 with only the highest bit set. The value would be 128. To make this equal to 0.5 we divide by 256. It can't be 0.5 in this position so we must divide again by 128. Similarly, Mantissa 3 is divided by 256, then again by 256 and finally by 128 to reveal its decimal value. Mantissa 4 is divided three times by 256 and once by 128.

This four-byte Mantissa gives an accuracy of approximately nine places which is accurate enough for most purposes.

The exponent is a power of two, ranging from -128 to 127:

$$2^{128} = 3.9 \times 10^{38}$$

$$2^{-128} = 1.7 \times 10^{-38}$$

This gives the maximum range of floating-point integers.

Peeking Out

A program to reveal the value of a stored floating point number would have to do four things:

Finally, find where the variable is located, secondly, evaluate the exponent. Thirdly, determine the sign of the final number and finally calculate the Mantissa. The following program does all of this.

Functional Arrays

Defined functions are also stored as a kind of variable. The first two bytes are the function name. The following two bytes point to the actual location of the function definition in program memory. The location of the variable used within the function is pointed to by the next two bytes. The location is always within variable memory. The final byte does not signify anything and remains at value zero.

Arrays are stored in an area which begins where the variable data ends. Where it ends well, how long a piece of string? The start position depends firstly on how long the program is and, secondly, how many variables have been defined. As a new variable is encountered by

the program, so the array memory moves up by seven bytes.

Arrays are as complex to store as they are to manipulate in a program. First a header must be created then a block of memory is put aside for all of the values liable to be created. The actual format can be seen in the tables at the end of this article.

Obviously, a vast amount of memory can be reserved for arrays and when you consider that this block has to be moved up seven bytes every time an ordinary variable is created, it is clear that this could slow the program noticeably. Some computers lack the ability to move the array area and all variables must be initialised in the first few lines of a program to obtain a fixed point for the start of arrays. Even though this is not necessary on a Commodore, it can be prudent, in cases where several arrays are used, to initialise integer, floating point, string variables with zero or null values before defining arrays. Also remember to define functions at this point too.

Get Organised

You will now see why memory is wasted when defining variables so that they all occupy seven bytes. It makes the moving of variables a lot simpler if a fixed space has to be created regardless of the variable type. This is crucial to chip memory management and many more examples of reserved memory will be seen in future articles, as we progress through all of the computer's chips.

PROGRAM: ARRAY PECKER

```
100 REM=0.125
110 REM=0:GOTO 14:GOTO 1000
120 REM=0:GOTO 14:GOTO 1000
130 REM=0:GOTO 14:GOTO 1000
140 REM=0:GOTO 14:GOTO 1000
150 REM=0:GOTO 14:GOTO 1000
160 REM=0:GOTO 14:GOTO 1000
170 REM=0:GOTO 14:GOTO 1000
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950 REM=0:GOTO 14:GOTO 1000
960 REM=0:GOTO 14:GOTO 1000
970 REM=0:GOTO 14:GOTO 1000
980 REM=0:GOTO 14:GOTO 1000
990 REM=0:GOTO 14:GOTO 1000
1000 REM=0:GOTO 14:GOTO 1000
```

Gordon Hamlett looks at US
Gold's pocket money range.

AMERICAN

WHEN BUDGET GAMES FIRST appeared, they tended to be poor versions of Space Invaders and Pacman, written in Basic and sold in newspapers and garages with no product advertising and very low company profiles. It did not take long though for the major companies to see that there was a place in the market for games at a low price and soon they were re-releasing their old titles at a lower price in order to gain an increased shelf life and profit from their products.

With this increased respectability, it was almost on the cards that US Gold, one of Britain's largest software distributors, would jump on the bandwagon. Americana is the title of the US Gold budget range. Nine titles have been released for the C64 in the initial launch and there is promise of some titles in the future for the C-16. As you would expect from US Gold, the packaging is slick with clear, plastic cases (unusual for the company) and a uniform colour scheme of yellow, reds and oranges. One of the criticisms levelled against US Gold has always been that the product has been too highly priced but I don't think that many people will be too disappointed if they pay £2.99 for one of these titles.

So what of the games themselves? They fall into two categories, some that have previously been released at a

higher price and some that have never before seen light of day under a US Gold label.

Pinball

Stardust is a pinball game that scrolls over four screens. You must knock down 17 targets with five balls in order to progress onto the next screen. There are four sets of flippers to manipulate and you can "nudge" the machine a limited number of times as you endeavour to keep the ball in play. An unusual feature is the two player option which is not as you may think, a head to head confrontation, but one player controlling the flippers and the other the nudges. I found this game highly addictive, and my favourite amongst the titles released so far.

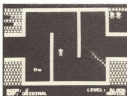
Adventuring

Scrolls of Abaddon is an arcade adventure that at first sight looks like a Pacman derivative but there is a lot more to it than that. You must explore a series of rooms searching for the four pieces of all the gems that are lying around whilst avoiding the saties. The more you move round the screen, the more you restrict your future movements as by picking up the gems, you put down

Left to right:
Breakdance,
Invictus, Stardust



Left to right:
Shamus, Invictus
Jazz, Office Follies



some directional arrows that must be followed. There are also scrolls to collect that contain spells to help you on your way.

Aradia

Odin's Aradia is a one- or two-player, 24-screen platform game, reminiscent of a cut-down version of *Bounty Bob*. On each screen, you must collect a key and make your way to the exit whilst leaping around the various obstacles. Balloons pursue you relentlessly although if you pick up an object, you have a limited amount of time in which to destroy them. There is the usual selection of teleports, lifts and ladders to be overcome.

Afraid Shuttle is a space shoot-'em-up game in which you battle your way through alternate screens of marauding aliens and asteroid belts. There are several varieties of aliens including blob men, spiders, and bomb launchers. The asteroid belt is solid and you learn a way for your ship to pass safely through it. At higher levels, the asteroids move considerably faster.

Another quite arcade game is *Neural Zone* where you avoid change of a perimeter gateway just, trying to defeat your daily warning station Alpha IV. You are given warning as to which direction the next enemy ship is

approaching from and must try to destroy it as quickly as possible. There are five difficulty levels to choose from and your score is determined not only by the number of enemies that you destroy, but also the length of time that you took to do it.

Street Life

New York City is a strange sort of game where the object is to go round visiting various sights such as the Empire State Building and the city Zoo. You can drive round the city or walk or use the subway. You will need to eat and get money from the bank in order to pay for your car repairs etc. At all these locations, there is a platform-type game to solve before you are allowed to proceed. If you crash your car, you get taken to the hospital which the car goes to the garage and all of the rest time and money. The entire game must be completed within a certain time period.

All Sorts

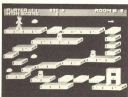
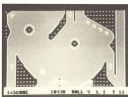
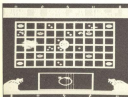
Shamus is a break type game which sees you trying to penetrate the Shadow's lair and destroy him. You must explore the mazes searching for colour-coded keys that allow you access to further levels. All this must be done while defending yourself against the assorted intruders.

There are extra lives to be gained either by collecting bottles or by riding walking over a question mark and there is the continual threat of the shadow to be overcome - he can't be killed, only stunned if he comes chasing after you.

Centinel is a Star Trek/Star Raiders variant. A map of the stellar grid displays both friendly and enemy forces and you must warp into the appropriate quadrant to do battle with the foe in an arcade-type sequence. There are long and short range scanners to help you find the enemy and you must navigate through asteroid fields as you travel in hyperspace to your destination. You must also find friendly bases where you can dock, refuel and rearm.

The final game to be released is *Breakdance*. In this you can select from four different variants as you try to prove to rival gangs that you are a better dancer than they are. This involves watching the computer opponent make a move and then copying it. If you get that right, you get a sequence of ten moves to reproduce, then three, then four and so on. Yes, it's so more than a station of Sines, one of the first ever electronic games. This one's only likely to appeal to dance fans.

Well, there you have it. Nine games, none of them really bad and all representing good value for money. Yet another winner from T&E Gold.



Listings will be much easier to enter with our new system.

COMMODORE LISTINGS ARE RATHER well known for the horrible little black blobs that always abound. Unfortunately the graphics characters which are used to represent graphic and control characters do not reproduce very well and they are also difficult to find on the Commodore keyboard.

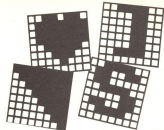
In future all control and graphics commands will be replaced by a mnemonic within square brackets. This mnemonic is not typed out as printed in the magazine but rather the corresponding key or keys on the keyboard are pressed. For example [RIGHT] means press the cursor right key, you do not type in [RIGHT]. All of the keywords, what keys to press and how they are shown on the screen are shown below.

Any character that is accessed by pressing shift and a letter will be printed as (letter).

[A] shift and A
[a] shift and +

Any character that is accessed by pressing the Commodore key and a letter will be printed as (letter).

[CA] Commodore and A
[C+] Commodore and +
[C~] Commodore and ~



LISTINGS

If any characters are repeated the mnemonic will be followed by a number, this number is how many times you should enter the character. Any number of spaces over one will also be represented in this form.

[RIGHT10] press cursor right 10 times
[C~10] press Commodore and + 10 times
[SPC10] Press the space bar 10 times

Any other character should be easily recognisable for example CTRL-N means press CTRL and N and LEFT-ARROW means press the left arrow.

Any number of mnemonics can be enclosed in brackets for example

[SATSAPCSASD]

means type 10 shift A's, 10 spaces and another 10 shift A's.

Mnemonic	Symbol	what to press
[RIGHT]		left/right
[LEFT]		shift left/right
[UP]		shift & up /down
[DOWN]		up/down
[F1]		F1
[F2]		shift & F1
[F3]		F3
[F4]		shift & F3

Mnemonic	Symbol	what to press
[F5]		F5
[F6]		shift & F5
[F7]		F7
[F8]		shift & F7
[CLEAR]		shift & CLR /HOME
[HOME]		CLR/HOME
[RESON]		CTRL & 5
[RVSOFF]		CTRL & 6

Mnemonic	Symbol	what to press
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[FOLLOW]		CTRL & 8

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Bill Bremner gets in a spin with his disk drive.

FAST FORMATTER

FAST FORMATTERS HAVE been commonplace on the C64 ever since the 1541 was added to the growing range of peripherals. Almost every function to do with the 1541 seems to be synonymous with a tail, and the standard 1.5 minute "MOS" FORMAT routine does little to help.

However, if the format routine is studied in depth, the reason for this sluggishness is made clear. There is a trade-off point in disk drives between speed and reliability: the faster you make operations such as data transfer and read/write operations, the larger the chance of data errors. The format routine used in the 1541 is designed to divide the disk surface into tracks and sectors, supplying a working area that allows the Disk Operating System selective data storage. Gaps are supplied between sectors and sector headers to allow for variations in the drive motor speed.

However, individual 1541s often run at different speeds, and although the difference is very small, occasionally problems arise due to sector over/under-writing. Commodore originally opted to use a fixed length gap between the end of one sector and the start of another (DOGS 1-6), but this eventually led to read and write errors. Later versions of DOGS formatting (including the 1541) were rewritten to allow for these speed fluctuations, achieved by writing a unique series of marks along a track.

These marks are timed and the results are divided by the number of sectors on the track to calculate the tail gap length. The same track is then re-read, formatted and re-written. This results in each track passing under the read/write head about 10 times, or two seconds.

Obviously, by-passing the timing routine and inserting a single constant for all the tail gaps on the disk would

PROGRAM: FAST FORMATTER

```
100 POKE 53280,11:POKE 53281,11
    :PRINT"CLEAR!"
110 PRINT"YELLOW,RIGHT4)
    FAST FORMAT V1.0 BY BILL BRENNER
120 PRINT"(RIGHT4)-----
    -----"
130 PRINT"(DOWN,SPC4)
    45 SECONDS-FULL VERIFY"
140 PRINT"(SPC7)-TAIL GAP CALCULAT
    ION"
150 INPUT"(DOWN2,SPC4)DISK NAME
    ":"N$
160 INPUT"(DOWN,SPC8)DISK ID:"ID$
170 OPEN 15.5,13:HI=3:FOR LO=0 TO 3
180 C$="M-W"+CHR$(LO*25)+CHR$(HI)+
    CHR$(26)
190 FOR B=1 TO 26:READ BY
    :C$=C$+CHR$(BY)+NEXT
200 PRINT*15,C$+NEXT
210 PRINT*15,"M-W"+CHR$(7)+CHR$(26
    )+CHR$(1)+CHR$(32)
220 PRINT*15,"UC:"+N$+"",~+10$
230 PRINT*15,"M-W"+CHR$(7)+CHR$(26
    )+CHR$(1)+CHR$(58)
240 CLOSE 15:END
250 DATA 160,68,165,159,250,153,0,4
260 DATA 138,16,247,160,100,165,25,
    5
270 DATA 153,69,4,136,16,247,76,91
280 DATA 4,160,3,165,34,217,67,4
290 DATA 240,6,136,16,248,76,54,253
300 DATA 76,13,251,31,35,18,1
310 DATA 169,11,141,42,2,169,0,141
320 DATA 1,2,32,238,193,172,123,2,
    165
330 DATA 0,2,133,16,165,1,2,133
340 DATA 19,169,1,133,128,169,1,32
350 DATA 211,214,169,224,133,1,165,
    1
360 DATA 48,252,32,238,209,238,123,
    2
370 DATA 338,123,2,76,64,238,234,
    234,234
```

reduce the formatting time by about half. By cutting out this routine various fast formatters that includes fast copiers with built-in formatters achieve their high speed, however they often take out the verify routine as well. Using a formatter which calculates the tail gap is more reliable simply due to the fact that the format is biased towards the performance of your drive.

The format routine I have written cuts down the formatting time by calculating the tail gap only when a new zone barrier is reached. The way the DOGS format routine works makes it easy for us to insert a simple patch. The FORMAT routine at 54280 sets up a PAF-MAC7 in buffer # 2 (54680), and activates formatting by storing an INCLUSIVE (148) job code in 50001, providing for continuous monitoring of the writing.

What we have to do is copy the first part of the setup at MAC7 into a buffer created during formatting. We can then insert a small machine-code routine to check what track the head is on, and if it's the start of a zone continue where the original code left off. Otherwise, the routine jumps straight to the track format routine at 5F04, by-passing the timing section.

A "JUMP" (JMP 4808) command is used to activate the routine inside the drive RAM, as well as providing a similar structure to the "MOS" command, to eliminate the disk name/id parsing problems.

Good luck, and be careful when typing in the program since hitting a wrong key is one of the commonest errors which amateur typists make!

Joe Nicholson

Improves the C-16's hi-res memory.

AS EVERY C-16 OWNER knows only too well, when the computer is in hi-res resolution mode only 2K is available for Basic. This article shows how the available memory can be doubled using assembly trickery.

When the hi-res screen is in use, the lowest conventional course not needed unless you use the split screen option in CBASIC modes 3 and 4. Therefore it should be possible to overwrite this lower memory area when using the hi-res screen. The problem is that when you are writing the program routine for the hi-res screen you need to use the low-res screen!

In theory, it is not possible to have a hi-res screen with colour and attributes without a low-res screen. This also means that you only get a miserable 2K for Basic.

The Method

The method we are going to use for 8K monochrome machine code routine which moves the Basic up and down depending on whether or not you are in the hi-res mode. The memory maps for each mode are shown in the two sections of Figure 1.

This method works on the principle that, although it is necessary to have complete hi-res and low-res screens, because only one screen is displayed at a time, it does not matter if the Basic is moved down into the low-res screen memory when the hi-res screen is active, and up into the colour and luminance memory of the hi-res screen when the low-res screen is active. The program is therefore moved down and up by 2048 bytes.

But why not simply move the 2K hi-res colour and luminance map down into the low-res screen and attributes block? In theory this should work (the Commodore 64 uses the low-res area for the hi-res colour when in hi-res mode) as it is possible to move the colour and attributes table around by POKEing bits 5 to 7 of register

PROGRAMMING THE C16

6308 (\$FF14 hex) with the top 5 bits of the high byte of the address of the table.

In effect this enables the position of the table to be in any 2K block starting at 8K, 2K, 4K etc. Note that because of the way that the C-16 interrupt service routine continually rePOKEs this address (the address with the value stored in \$007B, it is more effective to POKE bits 5 to 7 of address \$007B (\$040 decimal), the 'VM base mask for split screen' while in hi-res. Although the 2K colour/luminance area does move with this POKE, hi-res commands such as CIRCLE, DRAW, MOVE and BOX still think the colour and luminance maps are stored in their old positions. This means that the hi-res Basic commands still address the 2K block starting at \$004, overwriting any programs stored in this area.

Thus, although it is in theory possible to merge the low-res screen and hi-res colour+luminance maps together, the C16 does not allow you to use any of its Basic commands. This method would still work with machine code programs though, and also means that the code would not have to be re-locatable as the program would not have to move.

As this method would be useful to machine coders, the memory map of the system is shown in Figure 1. Note the resemblance this system has to the C64 memory layout for the hi-res screen. It could prove useful in adapting C64 machine code programs to the C-16.

The other 'possible' method of getting extra memory would be to move the low-res screen and attributes up into the hi-res screen colour and luminance

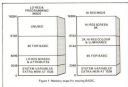


Figure 1. Memory map for moving BASIC.

tables. This should be possible by POKEing \$00, 24 while in low-res mode - although for this to work the machine's own interrupt service routine has to be disabled first. Unfortunately, again the C-16 still attempts to use the low-res screen at \$004 and writes to that area making your program look like a Chinese take-away menu card. You could use this method for machine code programs, but can't see any particular advantages with it.

So the only way of getting 4K for Basic appears to be to move the program up or

down whenever you want the low-res or hi-res screens.

A bit of a mess! Not really, it is now possible to use the hi-res CHARP and SHARP commands for instance (which can occupy up to 256 bytes per shape) and still have room for a useful Basic program. With only 2K of memory there was not much point in having these commands in the machine at all. Also the transition up or down takes place in a flash - literally.

Figure 2 shows the assembly test for the moving routine. This is based on the

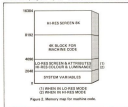


Figure 2. Memory map for machine code.

C-16 Assembler, which appears in the June 1988 issue of *Your Commodore*. If you haven't got this assembler up and running, the code is in DATA statements in Figure 4. Type this in and RUN+POKE the code into memory.

The routine occupies 256 bytes starting at \$0000 (\$100 decimal) in a portion of memory not used by the C-16. This space is not available to Plus-4 owners, but they wouldn't need to do this memory juggling anyhow, would they?

changing to \$0008 (2048, the new start of Basic).

Lines 11200-11470 call the 'Relocate line links' routine (RL) at line 14008.

Lines 11000-11470 change all the relevant system pointers so that the machine can carry on as usually whether the whole of Basic has been moved up or down. Note that this code is used by the MOVHBASE/CLIP routine (line 11800) also.

Lines 11000-11090 change all the pointers that are between \$00 and \$30 using a machine

code loop. The pointers changed are:

The 'start of Basic text' pointer at \$20-\$2C.

The 'start of Basic variables' pointer at \$2D-\$32.

The 'start of Basic arrays' and 'end of Basic arrays+1' pointers at \$3F-\$40 and \$31-\$32 respectively.

The 'bottom of strings' pointer at \$3D-\$39.

The utility string pointer at \$34-\$38.

The 'highest address used by Basic' pointer at \$1F-\$30.

Lines 11480-11470 change all the other pointers at odd places in memory.

Lines 11400-11425 change the 'current' DATA item address pointer at \$41-\$42.

Lines 11430-11438 change the 'current Basic variable' data pointer at \$47-\$48.

Lines 11440-11470 change the 'test pointer' at \$38-\$3C.

Lines 11470-11476 change the 'OFFEND' pointer at \$48-\$4C.

Lines 11480 then jumps to the RELocate/CLIP routine at line 10000.

Lines 11000-11200 are the

The Program

The program contains three routines: (1) set the top of Basic pointer to \$001 to have 4K of Basic, (2) move Basic down 2048 bytes to go into hi-res mode, and (3) move Basic up to 4096 again to go into low-res mode.

The 'set pointers to 4K' routine is at address 10000 (\$0000).

The 'move Basic down' routine is at address 10300 (\$0000).

The 'move Basic up' routine is at address 10600 (\$0000).

Note follows a line-by-line explanation of the program so everyone can marvel at just how clever it all is!

Explanation

Lines 11000-11480 build the MOVHBASE/CLIP routine. Lines 11000-11140 set the old and new start of Basic pointers for the relocate routine at lines 11200-11250. \$30-\$32 contains the old start at \$000, and \$47-\$48 contains the new start at 2048 (\$0000).

Lines 11250-11260 move the Basic down one page (256 bytes) at a time calling the BLOCKMOVE routine at line 10800 to actually move each 256 byte block.

Lines 11270-11280 set a vector for subtracting from the high byte of the pointers (such as the start of Basic pointer), setting it to -20 as in this case means that the pointers will move down 20 in the start of Basic pointer example, the pointer will change from 10000 to \$0000.

Lines 11280 sets the start of Basic for the line link address

FIGURE 3

10000	10000	RELLOCATE BASIC	11470	END FOR	14310	END
10001	101190	JMP RELOCATE	11471	END FOR	14311	END (NEXT, Y)
10010	END	\$0400	10480	JMP #0	14312	END R/L
10020	MOVE BASIC DOWN		11500	MOVE BASIC UP	14340	END
10100	LDA #0		11510	LDA #0	14360	GET UP END OF BASIC
11110	STX #0		11520	STX #0	14361	(BLOCKMOVE) (NEXT, Y)
11120	STX #0		11530	STX #0	14362	LDA #0
11130	LDA #0		11540	LDA #0	14370	STX #0
11140	STX #0		11550	STX #0	14380	STX #0
11150	LDA #0		11560	LDA #0	14390	LDA #0
11160	STX #0		11570	STX #0	14400	STX #0
11170	LDA #0		11580	LDA #0	14410	STX #0
11180	STX #0		11590	STX #0	14420	STX #0
11190	LDA #0		11600	STX #0	14430	STX #0
11200	STX #0		11610	STX #0	14440	STX #0
11210	LDA #0		11620	STX #0	14450	STX #0
11220	STX #0		11630	STX #0	14460	STX #0
11230	LDA #0		11640	STX #0	14470	STX #0
11240	STX #0		11650	STX #0	14480	STX #0
11250	END		11660	STX #0	14490	STX #0
11260	STX #0		11670	STX #0	14500	STX #0
11270	STX #0		11680	STX #0	14510	STX #0
11280	STX #0		11690	STX #0	14520	STX #0
11290	STX #0		11700	STX #0	14530	STX #0
11300	STX #0		11710	STX #0	14540	STX #0
11310	STX #0		11720	STX #0	14550	STX #0
11320	STX #0		11730	STX #0	14560	STX #0
11330	STX #0		11740	STX #0	14570	STX #0
11340	STX #0		11750	STX #0	14580	STX #0
11350	STX #0		11760	STX #0	14590	STX #0
11360	STX #0		11770	STX #0	14600	STX #0
11370	STX #0		11780	STX #0	14610	STX #0
11380	STX #0		11790	STX #0	14620	STX #0
11390	STX #0		11800	STX #0	14630	STX #0
11400	STX #0		11810	STX #0	14640	STX #0
11410	STX #0		11820	STX #0	14650	STX #0
11420	STX #0		11830	STX #0	14660	STX #0
11430	STX #0		11840	STX #0	14670	STX #0
11440	STX #0		11850	STX #0	14680	STX #0
11450	STX #0		11860	STX #0	14690	STX #0
11460	STX #0		11870	STX #0	14700	STX #0
11470	STX #0		11880	STX #0	14710	STX #0
11480	STX #0		11890	STX #0	14720	STX #0
11490	STX #0		11900	STX #0	14730	STX #0
11500	STX #0		11910	STX #0	14740	STX #0
11510	STX #0		11920	STX #0	14750	STX #0
11520	STX #0		11930	STX #0	14760	STX #0
11530	STX #0		11940	STX #0	14770	STX #0
11540	STX #0		11950	STX #0	14780	STX #0
11550	STX #0		11960	STX #0	14790	STX #0
11560	STX #0		11970	STX #0	14800	STX #0
11570	STX #0		11980	STX #0	14810	STX #0
11580	STX #0		11990	STX #0	14820	STX #0
11590	STX #0		12000	STX #0	14830	STX #0
11600	STX #0		12010	STX #0	14840	STX #0
11610	STX #0		12020	STX #0	14850	STX #0
11620	STX #0		12030	STX #0	14860	STX #0
11630	STX #0		12040	STX #0	14870	STX #0
11640	STX #0		12050	STX #0	14880	STX #0
11650	STX #0		12060	STX #0	14890	STX #0
11660	STX #0		12070	STX #0	14900	STX #0
11670	STX #0		12080	STX #0	14910	STX #0
11680	STX #0		12090	STX #0	14920	STX #0
11690	STX #0		12100	STX #0	14930	STX #0
11700	STX #0		12110	STX #0	14940	STX #0
11710	STX #0		12120	STX #0	14950	STX #0
11720	STX #0		12130	STX #0	14960	STX #0
11730	STX #0		12140	STX #0	14970	STX #0
11740	STX #0		12150	STX #0	14980	STX #0
11750	STX #0		12160	STX #0	14990	STX #0
11760	STX #0		12170	STX #0	15000	STX #0
11770	STX #0		12180	STX #0	15010	STX #0
11780	STX #0		12190	STX #0	15020	STX #0
11790	STX #0		12200	STX #0	15030	STX #0
11800	STX #0		12210	STX #0	15040	STX #0
11810	STX #0		12220	STX #0	15050	STX #0
11820	STX #0		12230	STX #0	15060	STX #0
11830	STX #0		12240	STX #0	15070	STX #0
11840	STX #0		12250	STX #0	15080	STX #0
11850	STX #0		12260	STX #0	15090	STX #0
11860	STX #0		12270	STX #0	15100	STX #0
11870	STX #0		12280	STX #0	15110	STX #0
11880	STX #0		12290	STX #0	15120	STX #0
11890	STX #0		12300	STX #0	15130	STX #0
11900	STX #0		12310	STX #0	15140	STX #0
11910	STX #0		12320	STX #0	15150	STX #0
11920	STX #0		12330	STX #0	15160	STX #0
11930	STX #0		12340	STX #0	15170	STX #0
11940	STX #0		12350	STX #0	15180	STX #0
11950	STX #0		12360	STX #0	15190	STX #0
11960	STX #0		12370	STX #0	15200	STX #0
11970	STX #0		12380	STX #0	15210	STX #0
11980	STX #0		12390	STX #0	15220	STX #0
11990	STX #0		12400	STX #0	15230	STX #0



ODD I & B

Sega-Byte

Oct - joystick

7 1 4 4 3



CHALLENGING FAST ACTION with superb background graphics are a feature of this shoot 'em up space game from Sega-Byte.

In part one you have to pilot a craft across various landscapes blasting everything that appears on the screen, dodging and weaving to avoid collision with your prey. The background animation looks stunning as it scrolls in sympathy with the movement of the spacecraft.

Odd I & B is equally as challenging but has more purpose to the game. It bears an incredible resemblance to

Alligra's Z but I shan't hold that against it.

As you pilot your ship over an alien complex you are shot at and harassed by enemy craft and gun emplacements. You must try to eliminate the power supplies and guns of the complex to win a round. This compels your craft into a space battle-bonus screen and then back to another complex which is even more dangerous than the one before.

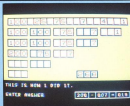
Otherwise the game are traditional kill or be killed programs with the distinction of high resolution backgrounds. **DB**

COUNTDOWN

Micro Software

CH

7 1 7 7 6



THIS GAME BASED ON Channel 4's Yorkshire Television Countdown will appeal to anyone who finds anagrams and arithmetic absorbing.

The game is split into three principle parts. The first allows you to select nine letters nominating each selection as a vowel or a consonant. When complete, both players have 30 seconds to extract the longest possible word from the selection of letters and the one who makes the longest word gains a point for each letter.

The second type of game allows one of the players to

select a series of numbers. At this point the computer takes over generating a random number. Both players then have another 30 seconds to devise a simple formula which will result in a number as close as possible to the computer's numbers. The player with the nearest value is awarded the points.

The final type of game is the Countdown Constraints.

A problem with this game is that all of the characters are left on the screen. This makes cheating a distinct possibility, so play fair.

LD

RACING BEAST

CH

Resisted

01.99

5 1 8 8 7



WITH THE CROWD BAYING for blood, you flick the red cape that you're carrying and stand your ground as the bull comes charging towards you. At the last moment, you lift the cape clear allowing the bull to pass underneath. Unfortunately, you misjudge things slightly and Alfonso, the bovine beast, rears you casually round the arena until your body can take no more punishment and the stretcher bearers have to carry you away to hospital.

That just about sums up the game. You attempt to get the bull to pass underneath your cape as often as possible

while he tries to gore you to death. If you are successful enough, the crowd throws a ring into the arena which you must endeavour to place on Alfonso's horns. If you are quick enough on your joystick when you are tossed, you can land on the bull's back and ride him round in fashion for extra points.

Given that the whole idea of bullfighting is particularly unappealing and that the game itself has few redeeming qualities, I can find no reason to recommend it, even at the price. There are many better budget games on the market.

GRH

BOOBY
 CD

Thriller
 LRM

4 1 6 7 8



SPHERE ME TIMBERS, AGOST behind, pieces of sight and other practical goings-on. The Black Catcon contains huge amounts of 3D action going on in its 20 levels, and as for the cabin boy, it is your duty to liberate as much of it as possible from those evil out-there. Not that they are likely to give in without putting up a fight, but you can cope with that, can't you?

Booby is an extremely addictive ballster and rump, varied, each of the levels contains assorted treasures and doors to other levels, but before you can access most of them you must first clear a

path through the numerous locked doors that stand in your way. These are all colour coded and sure enough, there are keys of various hues lying scattered around although you can only carry one at a time so that a lot of backtracking is required. Most screens start off empty but you soon find yourself chased by ghost planes and killer parrots!

Booby's graphics are simple and clear, accompanied by some awful Gilbert and Sullivan but the game's the thing and at £1.99 this one is excellent value for money.

G.H.

MAX HEADROOM
 Quiksilver CD + joystick



MAX HEADROOM. COMPUTER generated presenter extraordinaire, started life in a movie beating his name. The game is a blend of the comical Max of Channel 4 and the plot of the film.

The story follows the plot of the film very closely but this does not spoil the entertainment value. Max Headroom is, to be the presenter of a video show which will include an invasion advertising technique known as the "biquers" which has a nasty side-effect. Certain people viewing these ads will explode!

Such behaviour cannot be tolerated and Edison has been chosen to remove the Max Module from the massive NIT20 skyscraper. Intelligence sources have revealed that the module is hidden in

the laboratory behind a complex security system. Some of the security codes have been retrieved from the NIT20 computer. These allow Edison to reach all but the top two levels above the 20th floor. The code for the lab situated on Level 29th is in the Presidential Suite on the floor above and the code for the suite is in the Director's office somewhere on the floor below.

A door locking mechanism is in operation which must be breached if Edison is to succeed and the floors are guarded by vicious robots. Quite a challenge.

The lift security requires the operator to keep the single character code lit on an LCD display for a fixed time period. This is done by sending a small voltage along

the wires which connect to the correct elements of the display. The capacitance effect decays after a while and the elements must be refreshed regularly or the lift will go out of control and plunge you to one of the lower floors.

Once on the floor of your choice Edison is controlled by icons on each side of the screen. Your first task is to switch off the door locking mechanism to a human style game in which you have to play a randomly generated series of four tones back in reverse order.

At the same time the robots will be hunting in on you, guns blazing. Edison can withstand a certain number of hits but he may have to rest to recover from his injuries if he is badly wounded. This is where the time element comes into play.

Once he has located the key codes on the floors between Level 20th and 20th by searching each room in turn, he can gain access to the Presidential Suite to find the code for the lab. He can then locate the Max Module and rendezvous in the basement to the end of his mission.

At this point you are invited to load side two of the tape where an animated Max waits to speak a synthesized message to you. I would have preferred sub-titles to complement the speech synthesis because much of what he says borders on the unintelligible.

It is still a convincing piece of programming.

The game looked far more challenging than it turned out to be. I completed it in only an hour or two with two computer hours to spare. Just to test this man's beginner's luck, I tried again (twice) with similar results. With a few modifications this could be a great game but as it stands does not represent good value for money.

For example, if Edison quickly cracks the door lock code for the first floor he can hide in one of the rooms and crack all the codes for the other floors. It would have been more challenging if a floor code could only be cracked on the level in question with the robots beating down on him. This would necessitate running the gauntlet of robots and finding a breathing space to gain time to unlock the doors.

There are a few random problems like the man-bunnies Mable and Bregg who roam the floors, but this presented no real threat and most of the other problems, code changes and something nasty in the lab, failed to appear.

The graphics and music are excellently integrated to give a feeling of excitement and the lift sequence is simple but extremely effective. My the game is not more challenging.

I.D.



8 1 8 5 7



AMERICAN FOOTBALL seems to be all the rage at the moment. The strategies and showbiz glamour of the sport are gradually being absorbed into our culture. One day its popularity may reach the same degree of fanaticism which accompanies rugby or soccer today.

Artificially has reduced jumping on this handwagon too soon and consequently this game is far more inflexible to the British market than other computer simulations that I have seen.

Compromises have had to be made to allow the sport to be successfully portrayed. The roles of cheerleaders have been reduced to a single performer and the team consists of just six players per side.

The game options allow a two player tournament, man-

versus machine or a demo mode. The length of play can be five, 10 or 15 minutes per quarter.

Strategies are selected by joystick while the two sides are down in a huddle. The menu for the defending side consists of a choice of nine formations but offence is more complex.

The attacking side must decide the plays for team formation, two pass patterns and line blocking. If a kick is chosen, a new series of options is revealed allowing three types of kick.

Only one of your players is controlled by the joystick but he may pass the ball to one of two other players depending on the chosen pass pattern. Assuming the player can gain positional advantage without being brought down by an opponent, he can pass the

ball to one of his forwards. When the ball is thrown, the receiver becomes the one controlled by the joystick. If the receiver catches (snaps) the ball successfully he must gain as much ground as possible before a tackle is made on him.

While all this is going on the rest of the team should be successfully occupying the other members of the opposition but this only works if the correct blocking routine has been chosen.

As play progresses down the field you must decide whether to kick for goal or go for a touchdown. As in rugby, the scores are higher for a touchdown than for a kick. Successful touchdowns are rewarded with a chance to convert your score with a kick at goal.

The game is complex and contrasts with the rather crude scrolling of the graphics but such is the drawing power of the game you hardly notice this deficiency after the first few minutes.

As an opponent the computer is formidable though not infallible. Although I didn't succeed in defeating the other team I always felt that I'd blown my chance rather than feeling helplessly overruled.

The instructions are thankfully clear and despite the fact that my review copy was accompanied by the

original IBM PC game manual I managed to fashion a full one. I hope that the C64 book is a little more informative, a glossary of terms could help.

Plays are often individually devised according to the team's strategy so there is a series of diagrams explaining the mode of action which each play involves. Using these with the gameplan helps you to anticipate where the receiving player will be at any particular time while the play is still on.

Careless players will run back out of range of both of his incisions. This is indicated by a loud buzz when you attempt a pass. The only way out is to run forward and try to dodge the tackles of your opponents. This is not easy.

A kick can be blocked if your strategy is correctly chosen and your players are quick off the mark. The idea being to gain possession of the ball and then hang on to it as long as possible.

Watching your strategy pay off is immensely satisfying and when things go wrong the game becomes totally absorbing. Devisors of the game may cringe at the limitations of the program and those who don't know the game may feel overruled. Don't let this put you off, this game is great entertainment and you always have your hands full (hopefully with the ball).

L.D.

INTERNATIONAL

KARATE

System 3
C64/128

16.98

5 1 9 10 9



WHEN I FIRST RECEIVED A copy of System 3's latest game, International Karate, my immediate reaction was "Oh no, not another martial arts game!"

As a game, International Karate plays in a similar, if obviously superior way to Exploding Fist. In two player option, you must fight against a computer opponent in a series of 30 second bouts. Each time you beat the opponent three times your standard of belt is increased, although I doubt if many people will ever see black belt!

As well as the purely fighting parts, System 3 has included two different sections to test your control of the game. The first of these tests involves smashing bricks with your head, which is fun if a little futile! Secondly, and much more difficult, is a test which involves jumping, ducking and generally avoiding a series of weapons which fly towards you.

Priced at £8.98, International Karate can only be viewed as excellent value for money, and it is a game that no self respecting arcade fan should miss.

G.D.



THRUST

Mastertronic £1.99 C64



STRICT ORDERS HAVE BEEN given. Your mission: to seek out and recover a valuable batch of pods, scattered around a mysterious and dangerous network of caverns. The pods are protected by remote bases which have to be destroyed.

Once you have a pod, the task is to return it to the top of the cavern and return it to the atmosphere where you will be rewarded with completion points.

In theory, the game appears to be very easy but don't be misled by the first two missions. The first mission merely involves shooting one rather sleepy missile base, picking up the pod and thrusting back to the top of the cavern.

On each mission, fuel supplies are randomly

scattered and you need to collect as many as possible if you are to succeed. The further you proceed the longer the caverns become and with fuel becoming scarce you need to collect all the supplies that are available in the opening stages. Sometimes the fuel tanks are located next to the missile bases and trying to shoot one and not the other can be a real challenge.

The first encounter of real difficulty occurs in the third stage. You must guide your trusty and rather frail looking ship through a large and winding cavern that tends to bend at extremely difficult angles. There are several more remote bases to cope with and less fuel to be found but lifting the pod out of the cavern is, at first, quite a

daunting task. It will take you several attempts to master this stage but Thrust's addictive qualities will give you that vital incentive needed to progress.

The missions that follow this are far more difficult and your task becomes more complex. The caverns become huge and to gain access to certain areas a special button must be hit causing the previously locked entrance to slide open. One piece of advice for here is to not be too hesitant - when passing through the newly opened area, as the entrance soon closes again and finding your way being easier to death is not very pleasant.

Thrust is not as graphically stunning as the arcade original Centipede but it does feature some nice music and a satisfactory standard of sound effects. The caverns are visually good as are the gem-like pods.

One excellent feature of the game is the superb response of the keyboard, allowing sensitive control of the ship. Manoeuvring in the caverns can be very difficult in certain situations but this can be overcome by mastering the thrust control. Thrust and electricity are essential once you have attached the pod to the base of your ship. If you're not careful then the pod will swing causing its weight to drag you

into the walls and instant oblivion. Travelling too slow will result in the pod dragging your ship down to the floor of the cavern and, once again, immediate death awaits a ball of flames. If you do manage to guide the pod out of the cavern it is a simple task to shoot upwards to the top of the cavern where you will be rewarded with points for the completion of the mission.

There are numerous missions to complete, another contributing factor to the game's vast appeal. The argument that budget price software reflects the game will certainly be invalid in this case. Although previous budget software has often been of poor quality and of a far too difficult standard, this one should not be missing from any serious games player's collection.

An interesting situation could arise if Mastertronic follows up Thrust with another game of similar appeal. It would increase the grip of budget software on the games market, a circumstance that could put theighteners on the big guns forcing them to drop the price of their so-called 'better software'.

At present I could not think of a better way of spending £1.99, so go out and buy it. I guarantee you won't be disappointed in the slightest.

S.E.

SABOTEUR

C64 Disc II



A LOT OF REBEL LEADERS is contained on a disk, hidden somewhere in the central security building. You are being highly paid to infiltrate a building - seemingly a warehouse - find a disk and make your escape from the roof by helicopter.

The warehouse is heavily guarded with dogs and camera guarded weapons. On the ceilings to be avoided. Your combat skills consist of kicking and punching and you can also throw weapons that you have found - you start off with a shuriken, a

pointed throwing star and steel knives, rocks, grenades etc. as requis. Combat results in a loss of energy, shown as red bar. There are computer terminals to be manipulated for opening doors (although not all will be useful to you) and underground mine to be found as you explore the multi-levelled complex.

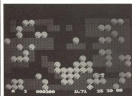
The graphics are excellent, especially with regard to the animation of the main character and the atmosphere created by the aid is very well implemented. Definitely an above average arcade adventure.

C.B.H.



THE RETURN OF ROCKMAN

Mastertronic ELN C-76 • Japankit



AFTER BEING ROCKMAN, the Return of Rockman filled me with anticipation of another exciting search through rock-filled caverns. In the diamond mine, I was disappointed.

The caverns are complex enough but the game is let down badly by the jerky animation which drove my eyes crazy. Rockman is a cute little character who inhabits a very dangerous world. His passion for diamonds is the only thing that keeps him going in a never-ending search.

The skill of the game lies in your ability to reach the

diamonds without blocking your own path with rocks or falling foul of the fast-moving hazards. Speed of action and thought are the skills required. Delay too long and tons of rock will descend on Rockman's path, killing him outright, move too quickly and falling boulders will block your way to the diamonds.

Why the screen should jerk around so much instead of scrolling gently is a mystery to me. I admit that it adds to the difficulty of the game but it also puts an incredible strain on the eyes.

ED.

VIVA VIC

Hammond Vic-20 • Japankit



VIC-20 OWNERS PREPARE yourself for a treat. Rarely do we have good news for you but at least Jeff Minter has not forgotten you.

Ever since he formed Hammond in the early days his games have attracted a lot of attention. In many ways the games market owes a lot to Minter's innovative experimentation in the development of the sophisticated games we see today. His taste is in the realm of fast action but his techniques have been applied in many different areas.

Arctic Attack was going to be a version of Defender but was changed to avoid possible litigation with Atari. It also halted the start of Minter's preoccupation with flora and gave vent to his love of that country's wildlife especially the llamas.

With Fluxx he may have painted the town red but certainly this became the predominant colour on the monitor screen. Based on another arcade game, it uses your own pursuit around a grid by as many as nine live bugs. Your aim is to enclose each square of the grid which then turns red. If you capture the corner squares, the hunters become the hunted as you race around the screen gobbling up the bugs.



Gridrunner was the game which really showed Minter's mastery of the medium. Twenty ways of very fast action in a mere 1.5K is quite an achievement especially as it only took a week to write! A Centipede-like creature is threatening your space grid and the humansoids under your protection. Your aim is to blast each centipede out of existence with your plasma gun but a hit causes it to split into two parts, doubling the threat. Two enemy craft patrol the edge of the grid and you also have to avoid their bolts while you battle on.

Layer Zone places you in control of two cannons which

run along two rails running at right angles to one another like the X-Y axis of a graph. Always attack towards the rails with ever increasing determination and you must coordinate the position and direction of your firing to protect each gun. Often this means using one gun to protect the other in a state of absolute panic.

Matrix is an expanded version of Gridrunner and, like some of the other games, needs at least 8K expansion. The action is even faster than the original game and features many more embellishments.

Metagalsactic Llamas will not solely use the strength of

the game but equally on its rather fun catching side. It was to be the forerunner of Minter's long delays with the ungulate breeds in his forays into the C64 market.

Genetic manipulation has led to the development of Metallamas which spit laser beams at the spider horde of the live lizards. If one of these Cyborg arachnid mutants manages to land on the planet at the Edge of Time, it changes into a Wirehead which heads towards the llama. Only skilled snatching of laser spit from the sides of the screen can save the llama now.

Like most Minter games this collection represents almost pure chaos 'n' excitement. I always get the feeling that he uses the human race as guinea pigs for his experimentation with gameplay techniques. Playing them is like doing some sort of ability test. This is not surprising because Jeff genuinely loves his games and tends to write for his own enjoyment rather than for pure profit. It's fortunate for him that his love of fast action is in tune with so many game players around the world.

I would not say that Minter appeals to everyone's taste but love him or loathe him you can't ignore him. ED.

NEWS

Across Development
 £9.95 each (US\$9.95 each) C&A • joystick



KICKING THE DRUG HABIT is slightly gaining a lot of publicity lately. In this game you get a chance to kick the man behind the potholes. A drug ring in Colombia, South America, has kidnapped a friend and your newspaper has given you the chance to rescue him. In return you can help to smash the ring by hunting out the answers to 22 burning questions.

The parasilitary members of the ring are holed up in a sprawling HQ complex where room upon room harbours clues to the ring's operations. This stronghold has been breached by a team of secret agents (NEXUS) who will help you to search the building for these clues and to find your friend, Tayo.

Long passages and complex lift networks connect the various sections of the complex but each floor requires a special colour coded pass card which the NEXUS team will happily supply. Without the correct card you must rely on your skills in karate and on any weapons you can find to defeat the enemy forces.

A specific member of Nexus can be contacted via a computer location system. The blue personnel computer may be found in one of the many rooms on the various levels. Held in the

databases are details of all the NEXUS personnel. Most are hungry recruits but three have special skills. Fiona can tell you where to find hand grenades. Paul is an informer and can point you towards a specific clue and the other specialist can show you where the stun guns are hidden.

To hide their true identities the agents must behave like the ring's goons. If your pass is invalid they will attack you unless you reveal your identity with a special greeting. Even Tayo will attack if you fail to greet him. It's a tough world in the complex.

All commands are issued via the joystick. Attacking moves are made with the fire button pressed and this mode also gives access to the special command menu. From these options you can greet your friends, check your score or arm yourself with grenades or a stun gun. The defensive moves allow you to duck and weave in battle or to move around the corridors.

Most of the screen is reserved for information panels, with an elongated window at the top showing the animated gameplay. When a room is searched the floor either changes colour or remains spot as an indicator and, while you are hunting for an unsearched room, a



long range 'radar' map will show you any villains lurking further along the corridor.

At either side of the screen are two panels which show the faces of any of the NEXUS team who are currently on the animation system. The pictures are digitised images of real people, giving a touch of plausibility to the game.

On one of the floors you will find the ring's transmission floor. All of the information which you have gleaned in your searches can be relayed back to your editor from here. Marks are awarded for decoded answers to the riddles and for any photographs which you may have taken with one of the cameras located around the HQ.

There have been several 'corridor' games produced in the past but few have managed to combine the elements of adventure, strategy and action which this game communicates so successfully. The search for Tayo can be approached on two levels. At a quick hit and run after the room searches can be largely ignored but your battle skills will be honed to a fine art, or a full blown assault on the HQ building your abilities to think coolly and logically under pressure will be tested to the full.

Recommended as a worthy addition to anyone's collection.

E.D.

HEXTEK

Intellivision
 £1.99 C-16 • joystick

HEXTEK IS ONE OF THE OLDEST types of arcade computer games. I first saw a version of it on the Apple many years ago when it was known as Apple Panic. It must be the granddaddy of all platform games.

The screen is split into five levels connected by ladders. Roaming maliciously from floor to floor are monsters cut for your blood. The only means of defence is a spade with which you can dig holes to trap the monsters. Hit the sharpie clips into the realm of a video natty as you bath your wiry quarry about the

ears with the spade until it falls through the hole to certain death.

As you progress the monsters get nastier and you have to dig aligned holes in several levels so that the nasty creature can fall far enough to make his trip a slide with death.

The placement of ladders is made on a random basis so no two screens are ever quite the same. There are 98 levels to pass through and judging by my performance I fear that this may prove to be an inexhaustible supply for me.

E.D.





PRINT SHOP

FROM
PRECISION SOFTWARE

**Stuart Cooke takes a look at
a package that will make
your rubber stamp obsolete.**

EVERY ONCE IN A WHILE A PROGRAM appears that makes you wonder how on earth you managed without it. Printshop is one such program.

In a nut shell the program will turn your C64 and your Commodore compatible printer into a specialised print shop dealing in letter heads, cards and banners. Now you can generate your own stationery, print your own birthday cards and generally impress your friends.

In Use

The program is extremely easy to get started, you simply load the program from disk and wait until the menu appears. The following options are available:

GREETING CARD
SIGN
LETTER HEAD
BANNER
SCREEN MAGIC
GRAPHIC EDITOR

The Greeting Card option lets you choose from either pre-designed cards such as birthday and Christmas greetings or you can design your own. If you choose to design your own you can choose a graphic from the numerous available on the disk. These range from a Christmas tree to a floppy disk.

As you can see, the range is extremely large. If you do get fed up with the graphics available on the disk you can either purchase one of the graphic supplements that are available which give you even more graphics to choose from or you can use the Graphic Designer option from the main menu to design your own. A number of graphics have been included with this article so you can see what sort of detail is possible.





Once you have chosen graphics and the border for the front of the card which can range from hearts to a single line all way around the edge, you can select the font that you want your message to appear in. The available fonts are:

When you type in your messages you can choose numerous options such as, where you want the text positioning and whether you want the text to be printed as outline, in 3D or solid. Examples of the fonts have also been included so you can see exactly what they look like.

The greeting card option prints four

sides on one piece of paper. Simply fold it and you have a ready made, customized card.

The sign option offers similar facilities to the greeting card option but will allow you to print one large picture. There are no positions of the graphic used in both this and the card option can also be changed, this means that the graphic that you use on the sign could be either about one inch square or fill the whole page. Also the smaller the graphic the more that you can print on the page. Signs is a great way of producing cheap posters with a little character.

The letter head option is simply superb. Basically this option allows you to produce paper with a customized header in any of the fonts. The text at the top of the paper can be centered or moved to the left and right of the page. Graphics can also be added and you have the option of just placing graphics in the corners, putting a graphic every other space or having a solid band of graphics. It is also possible to place text and graphics at the bottom of each sheet of paper.

To use the letter head option to its full potential you would have to produce numerous sheets on fan-fold paper and then stick this back into your printer so that you could use it with your wordprocessor. Time consuming but well worth the effort.

The banner option will print large letters sideways on the paper. This can be used to print messages in any of the fonts. Graphics can be added at either end of the message. This is great for producing large banners for parties etc.

The screen magic option simply draws pretty line patterns on the screen, once a pattern that you like has been displayed you can store it so that it can be printed out. I must admit I don't think that this option is of much use, it simply isn't as much fun as using the graphics included or your own.

As previously mentioned the Graphic Editor allows you to design your own graphics, print them out and store them on disk for retrieval at a later date. Great fun if you're any good at art and would like to send a specialized message to someone. The graphic editor is easy to use and all available functions are clearly displayed at all time.

Print shop is simply an extremely useful and fun program. Just think, you may never have to buy another birthday card. Mind you, one friend did go a little far when she used Print Shop to send a wedding invitation to her Goldfish!

RSVP
ALEXIA
NEWS
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George Duval doodles his way through some Amiga software.

Art on the

HOWEVER IMPRESSIVE THE AMIGA's hardware specifications is, it wouldn't be anything without the plethora of high quality programs which have been written for it, to take advantage of the technical standards.

Almost all the software I am going to talk about was programmed in America, but with the Amiga having been recently launched at the Commodore Show, it seems that many British software houses are developing programs of a very high standard.

Commodore

When Commodore launched the Amiga in the US, they had planned to have two pieces of software available: *Graphicraft* and *Textcraft*. *Graphicraft* is an entry level graphics package, as its name would suggest, which although not very special, allowed many people to get the feel of the machine's capabilities - and work out what could be done when a really good package appeared.

Textcraft is a very basic word-processor that, although it provides most of the functions of what you would expect (headers, footers, help files, text styles etc.) lacks the finesse to put it up with the excellent packages available for the Amiga's closest business rival, the Macintosh. However, as it is the first, it succeeds in filling a gap that would otherwise make the Amiga an unreliable product.

The final product in the Craft range is *Musicraft*. Although it is not yet finished, I have seen the most up-to-date version and can tell you that it has a great deal of potential.

Musicraft has three main options; the first is a straight score which allows the user to enter or edit a file, as if were in true musical notation (and you don't need any Tupper!). Option two is to play using the Amiga's keyboard, which is all very well, though a little impractical to say the least! Finally, and in my view most importantly, is the waveform editor. This allows you to load and edit waveforms to produce almost any sound you could want.

Graphically you can draw the waveform you want, or you can choose from a sine wave, a step-up, a step down or a variety of others. This section also allows you to edit the envelope and various filters (of which there are quite a few).

If you are a budding musician, *Musicraft* has a great deal of promise, and if (as we all hope) Commodore was fit to release it with a full MIDI sequencer built in, it could easily be of use to professional musicians.



One product for which everyone has very high hopes is Commodore's *Transfusions*. This is the much-heralded piece of software that will allow Amiga users to run existing IBM PC and compatible software. Although I have seen this product, I cannot vouch for its 100% reliability as no one has any dumb 5.25" drives to test it out on. However if this product is finished and released, you can be sure it will have a phenomenal effect on the Amiga's market penetration!

Electronic Arts COMM/AUG/F/M1/F1

In America, the first company to receive Macintosh development machines was Electronic Arts, and it was therefore not



very surprising that EA released the first piece of software which really showed up the Amiga's capabilities, *Dynabot* (or *Dynabot* as it is more commonly known) is without doubt the most comprehensive and impressive piece of graphical software ever to appear on a personal computer! This may sound like a very over-the-top statement, but it has to be seen to be believed. *Dynabot* provides many levels of use that vary from fun for the Amigauser, who wishes to show what his machine can do, to incredible pictures from artists who decide the Amiga is the tool of their dreams.

Dynabot really does make the most of the Amiga's limitless capabilities. It can operate in any of the three graphics modes, low, medium or high, although

VAMIGA



high resolution requires the use of interesting techniques and is therefore very demanding on memory.

Starting to use Dpaint is really simple. Either you can control everything via the mouse or, for the more experienced user, you can use the optional keyboard commands - which certainly speeds up the process of drawing no end.

Having selected the mode in which you wish to draw, you are then presented with a blank screen. On the right you have a permanent control panel, and the top screen has a variety of pull-down menus. To start, the best thing to do is load in some of the provided files, these vary from a very impressive interpretation of Botticelli's *Venus* to a technically amazing starlight scene.

Once you have got to grips with the

basics of Dpaint, you can start to use some of the effects that put it so far ahead of any of its competitors. The control panel allows you to pick a variety of drawing shapes and commands. You can draw lines, boxes, circles, polygons, arcs, and ovals (all of which can be filled if appropriate). You can also choose to add text in any of 12 fonts, as well as being able to draw using various symmetrical options.

It must be said however, that these are only the very basic commands - the complex ones are awesome. Perhaps the most famous feature of Dpaint is its ability to pick up any section of the screen and use it as a brush. In other words that you could pick up one of *Venus's* eyes, enlarge it, use it round, and then draw with it. This is very

effective if you wish to create multiple images, each of which takes up only a small section of the screen.

Another feature of note is the zoom, which allows you to enlarge any section of the screen to a greater size, thus making it much easier to edit or change detailed sections.

For people who wish to give an impression of basic animation, the comprehensive palette adjustment and colour cycling abilities will be vital. By allowing you to alter the palette completely, it is possible to create 32 varying shades of whatever colour you wish, and by then choosing the range of the cycle you can produce some very realistic movement. This is very well illustrated by a file called *Waterfall*, which comes on the Dpaint disk.

Quite three dimensional filled drawings can be easily created using the wide variety of colours, in unison with the Blend, Smooth and Shade commands. They allow you to use the artwork technique to the full, and can lead to some very impressive results.

Because Dpaint uses the standard BIFF format for graphics files, any printers created on one of the other popular graphic packages can be loaded into Dpaint and then edited.

Printers are all covered for through the Workbench interface, but I must mention the Glimate 20 printer which, when used creatively with Dpaint, can produce some of the most outstanding colour stamps I have ever seen.

Overall Dpaint is a spectacularly good piece of software. Its only real fault is that it is sometimes a little slow, mainly due to the fact it was programmed in C. Otherwise it must be said that if you own an Amiga, you must have Dpaint!

The biggest problem with releasing one piece of software as good as Dpaint is that everything else must be as good. If not a little bit better. Electronic Arts' next release, another in the productivity series, is *Deluxe Paint*.

Using files either created on Dpaint, or built into the graphics of Dpaint, this package is a comprehensive pointing utility that allows the user to create letters, cards, signs, stickers, invitations, and a whole variety of other things amazingly simply.

Not only can you load other BIFF files, you can overlay them in any of the fonts provided, and even use the banner command to enter text strings longer than 81 characters. To make the most of Dpaint you really need one of the wide variety of colour printers catered for in Preferences, the results just don't look the same in 16 shades of grey!

In theory, Dpaint could be used to

produce small booklets or, using some special functions, colour separations. Products like Dpaint show how close we are to complete magazine production on a disk.

If these two packages were not enough to establish Electronic Arts as THE software house for the Amiga, the finishing touches are being added to a product which should subsume everything before. Named The Deluxe Video Construction Set (ghweh!), it will do for animation what Dpaint has done for static graphics.

Deluxe Video was written to let Amiga Users create animated shows that could either be for fun or, in a business environment, practical. Professional video companies will find the scope for Deluxe Video endless, and in many ways it should assure the Amiga of a certain market.

As well as creating animated drawings, Video allows you the unprecedented feature of being able to add a complicated soundtrack - anything from explosions to Vangelis. Using a graphics storyboard, and a variety of timing marks, Divideo can create sequences that many competent video programmes would be very jealous of.

I have already seen one very impressive sequence created using Divideo, showing the various stages of the shuttle, from a close up at take-off, to a sequence of it orbiting the world - and it certainly lived up to my expectations.

Without doubt Electronic Arts is very confident of the Amiga's success, and if EA keeps on producing software of this quality, it really can't fail.

Amiga

If there is one company that has managed to rival the quality of Electronic Arts when it comes to graphics packages, it must be Amiga. Not only has this company produced an animation package before EA, has managed to release Deluxe Video, but it also has an excellent graphics package.

Amigos is Amiga's attempt at a graphics package to make the most of the Amiga. As with Dpaint it uses 3D format, allowing pictures to be imported from and exported to other packages. Although Amigos is an outstanding product, it unfortunately isn't as good as Dpaint. Deep down, it lacks the facilities that enable such easy creation of complex pictures.

Perhaps the most notable difference, when compared to Dpaint, is the inability to create brushes of anything but a limited width. Amigos has one major thing in its favour - Jim Sachs. He is the resident guru for Amiga, and is

without doubt the best artist on the Amiga. His Paradise files (especially the new Turbo) are astonishing.

Amiga's second release for the Amiga is Animator, a complex and very good animation package that uses storyboard techniques - in a similar way to Divideo - to create excellent sequences. Written by the now defunct Island Graphics team, it allows the user to create

Art on the AMIGA



anything from basic polygon to polygon mixing, to much more complex filled graphics animations.

Although Animator runs in low resolution mode (320 x 200), commands such as rotate, bank, rotate and have allow you to mix shapes and colours to create some very effective 'Thomax' graphics, and I'm sure that given enough time someone could produce a very good version of the Channel 4 winning logo!

Space seems to be the order of the day as far as animation packages are concerned as the one storyboard provided with Animator consists of an Apollo looking like landing on the moon. Using the background ability, a very effective three dimensional feel has been created.

My personal favourite product from Amiga is Draw. Designed primarily as a serious CAD/architectural program it allows you a variety of features you would not normally associate with graphics packages and which, especially on the Amiga, can be used very effectively.

A massive variety of straight lines, three dimensional boxes and polygons are all available at the click of a mouse! Perhaps the most dramatic facility of Draw is Zoom. This allows you to move in amazingly close to edit any previously created pictures. Draw is another product, like Dpaint, that would quite easily justify the purchase of an Amiga, if you had the right application for it.

Overall, Amiga are a very good software house. Until now a little overshadowed by EA, but by getting Animator out before Divideo, and by releasing the excellent Draw, Amiga has proved that it's really a force to be reckoned with.

Various

As well as the big companies who are producing more than one program for the Amiga, there are plenty of companies producing one or two products. One of these companies produces a product called Calcom. As its name suggests, this is a collection of little utilities that add up to a very impressive package indeed. As well as the now obligatory calculator, there is an excellent communications package, and plenty of other bits and bobs.

Whilst on the subject of comms, I thought I'd mention an excellent terminal program I received called Onlined. Not only does it allow the Amiga to emulate various other computers, but it allows split screens, stored files, auto dialling, preset calling (which means you can let it to call up a certain system at a certain time and grab any messages before logging off), and all for \$20 in the UK.

Not to be left out, England has at least one product to be proud of. Although not finished yet, TTA's Preset software is particularly impressive - especially when you consider that the Amiga has been on sale in America for more than six months!

Conclusion

It is a great relief to me to see the quality and quantity of software that is coming through, both from America and more recently the UK. Products such as Deluxe Paint are of such a high quality that they almost assure the Amiga's success, whatever its critics have said.

WORDPROCESSING

on the

PLUS/4

Artie Blomberg
provides some handy
tips for Plus/4
Cassette users.

IT HAS ALWAYS STRUCK ME as being extremely silly that Commodore packaged the Plus/4 computer with a cassette recorder. The reason that it seems odd is because in-built software has no way of **SAVING** to this device. Don't despair, I have found a way in which you can use the in-built wordprocessor with the cassette recorder. Now you don't have to go to the expense of buying a disk drive.

As well as giving information about how to use the Plus/4 with cassette, I have also modified the Full Speed Ahead! fast tape routine so that it sits in a better place in the Plus/4's memory so that you can write larger programs as well as use it with the wordprocessor. Now you can **SAVE** and **LOAD** documents just as fast as your friends with disk drives.

Saving Documents on Tape

Type the document as usual, you can print it either before or after saving on tape. However, you will need to make a

note of the last line of your document in the word processor. Read '1' on the display on the bottom of the screen.

When the document is completed enter the Machine Code Monitor by following the procedure below VERY CAREFULLY.

1. Press the RESET button (small button next to the on/off switch) and load it as described.
2. Press and HOLD down the RUN/STOP key (next to SHIFT LOCK).
3. Now release the RESET button, and after the screen has changed, the RUN/STOP key, if the RUN/STOP is pressed first it puts the letter 'C' in the document.

The document is stored in RAM memory starting from location 1000 finishing according to its length. It is possible to view it in the monitor's ADCII dump display, type "MC000" (RTN) but only upper case letters and numerals will be shown. For the monitor to access RAM above 8000, you have to change the value in location 5078 to 140. See the Plus/4 manual page 181 for a full explanation.

Now type the following to save the data:

```
S'TITLENAME";LC000XXXX
[RTN]
XXXX being the end address
```

found in the table below according to the last line of text in the document.

The cassette recorder prompts will show as normal. To load a previously saved document enter the word processor first and go to the Machine Code Monitor as described above, but clear any document from memory first, by typing CBM'C', then 'on' (RTN).

If you don't clear the documents, will merge - which could prove a useful facility, load a short document into the top of the processor to merge with one already in the lower part.

The load command is 'I' (RTN). You can specify "FILENAME" after the 'I', as on tape it will otherwise load the last program that it comes to. I hope, however, that you will keep a clear record of the cassette recorder revelations for each document as, unlike the disk drive, it cannot go straight to a file. If you do not know where it is, you may have a long wait before the letter which you want to load is found.

When the tape has stopped key 'I' (RTN) (RTN): The Plus/4 has taken as to the speedometer, key CBM'C' and then 'on' (RTN). You will now be in the wordprocessor with your document displayed. Use the same procedure to return to the wordprocessor after saving on tape.

Another merge possibility is to save the document not from the beginning, but from a later line number. In this case substitute '0000' with the corresponding line number for that line in the table. Doing it this way, we lose the last pointers for that section, as these are stored in the first part of the RAM at 10000 before the actual text. It is best to not save again at the end of each paragraph after merging, in order to be able to use the edit facility.

I have encountered a strange phenomenon when printing a document after loading it from tape. The same may also happen when loading from disk.

If you print straight after loading, it will only print up to the line actually displayed on the screen, and will only print the whole document if you have run the cursor down the document to the bottom line at some stage. You may also find peculiar things occurring if you try to add, insert, or delete lines without going down to the last line first. And the shifted ClearScreen will not take you right down until you have viewed the end of the document.

Using Fast Tape Save

Published in the February 1986 edition of Your Commodore magazine was an

WORDPROCESSING

article and program by Nick Hampshire called *Break the Speed Limit*, a Fast Tape Save/Loader, which I have used for all my programs since. I have found that it also works excellently with the word processor, if the routine is stored at line \$7000. The program as published stores the Machine Code Routine at \$0000, top of RAM for the C16. In order to store it at \$7000 or any other location, some of the lines have to be amended as shown in the listing.

Using the features with the word processor you have to stop the Plus/4 from

jumping into Basic after loading or saving, as you cannot get back to the word processor by the "SYS1620" command on key T7 without clearing the document from memory. This is presented in line 1700, forcing a BRK to the Monitor. To activate the Fast Save when in the Monitor, the command is "G7000 [RTN]", in the same command, substitute "J" for the "I" after the second "J". Now tapes will work about 10 times faster.

As the document can be up to eight kilobytes in length, normal tape operation will take almost five

minutes to load or save, whereas features will do it in about only 45 seconds. Incidentally, roughly 20 seconds of this time is taken up by leader, header and gap, and eight kilobytes of data is actually written and read in only 20 seconds. I urge you to use the features routine - you will definitely not need a disk drive then.

You can load the previously saved features routine from the Monitor either before entering the word processor or after, by the command "J [RTN]". If you do the former, you can also load it from Basic with "LOAD" - "J". When ready to feature you must have command "G7000" and then use device code "J" before the address.

If you want to use the fast tape routine with other programs, I find it best to store it at \$FD00, which is the highest RAM that Machine Code can easily access. To protect this from being overwritten it is necessary to lower the top of memory by "POKE \$E, DEC(127) CLR". This leaves 2560 bytes for your Basic program and variables.

If this is too little, I suggest you store the routine at \$7000, which is the beginning of RAM for Basic, so the vectors for start of Basic will have to be raised before you load and run the Fast Tape Loader, and any programs that have been fast saved previously. Do this by "POKE(127), POKE(143), POKE(256), NEW".

This will not work if you are going to use the Hi-res mode.

Then store the routine at \$4000, and take the start of Basic to "DEC(407)". But you have to command "GRAPHIC 2/ [RTN]" at least once before loading - or moving the start of Basic. If you use Hi-res mode with the features routine at \$7000, the start of Basic will not have to be moved, but you should also use the "GRAPHIC 2/1" command first before loading. Don't use "GRAPHIC CLR" at all. Whenever I have

tried to, it just seems to move Basic higher up rather than lower. Although "GRAPHIC 0" on its own is alright.

I find that it is best to load the features routine before any Basic programs, and then type "NEW" [RTN]. But you do not need the routine to load a featured program, this is only necessary if you intend to do more saving.

Wordprocessing Tips

If you want to write quotation marks ", you will find that pressing defined "J" will give an apostrophe. To get a proper quote you have to use its ASCII value 34 in numeric video (Control key/BA's On), the manual calls it "Embedding ASCII Characters". You then type "sc34". I have found some problems in using this, in that sometimes the character appears in the wrong position, perhaps in the middle of an adjacent word.

I think this has something to do with the justification of the document, as it doesn't seem to happen when not justified, so it may be easier to give the command so justify preceding the paragraph with the quote.

Another method which allows you to keep the justification is to ignore the incorrect position of the printed ASCII character, and you have finally edited and corrected the printed document.

You now have to force the line in which the ASCII character appears to become the end of a paragraph. Place the cursor on the word that, on the paper, starts the next line after the ASCII character. Now insert spaces (shifted Ins/Del key) so that this part of the text moves and it is at the beginning of the next line on the screen. Then move the cursor back to where it was when you started inserting and press return. Although a new paragraph has been created, it will still be printed as continuous text. Occasion-

PROGRAM: FAST SAVE AMENDMENTS

```
800 REM * ADDITIONAL LINES TO FAST
SAVE IN YOUR COMMODORE PET 1964 PA
GE 20
910 REM * TO LOCATE THE ROUTINE AT
AN LOCATION FROM $1000 TO $7D00
920 REMOVE* LINE 1165 UNLESS SAVING
A FAST SAVE ROUTINE FOR WORDPROCES
SOR
930 INPUT"LOCATION" :HX=HE-DEC(HX$
):HL=INT(HX/256):SVHL=HX/256 THEN
GOTO 900
1100 POKE%HL:CLR:HL=PEEK(56):HX=
HL*256
1110 I=HX:T=0:DI=HL-61
1125 T=T+A:IFA<65535 A=64THEN CB=1
-HX:IFCB<25535 CB=25535 CB=2576
THEN A=A+DI
1130 POKE%HL
1165 POKE%HL:G:POKE%HL+197,G:POK
EHX+10,G:REM THIS LINE ONLY FOR WO
RDPROCESSOR
1202 PRINT"(DOWN) 'SYS'HX" TO A
CTIVATE FASTSAVE "
1265 PRINT"(DOWN) TO SAVE AS MACHI
NE CODE ROUTINE GOTO"
1267 PRINT"(DOWN) MACHINE CODE MON
ITOR AND COMMAND"
1209 PRINT"(DOWN) S'CHR$(34)"FASTS
AVE"CHR$(34)":J,"HEX$(HX) ",HEX$(H
X+635)
1210 REM SYS HX:END
```

on the

PLUS/4

ally, you have to do the same with the beginning of the line with the ASCII character to get it laid out correctly.

It can be a bit tedious, but worth it if you want to have a good looking document. Don't forget to set the pointers at the end of each paragraph as, if you try to edit without, you will tear your hair out with frustration.

As well as the 'inverse on/off' (possible with letters) 'asci140', as mentioned in the manual, other ASCII codes that can be embedded are:

reverse on	asci18
linefeed	asci38
graphic mode	asci140
reverse off	asci18
carriage return	asci13
nongraphic mode	asci37

The graphic mode 'asci140' will enable the graphic characters that can be generated by defined alphabet keys (not with IBM keyboard printed), but you will not see them displayed on the screen as such. You have to check the symbols on the keyboard carefully and type more or less blind.

It appears you may also have to repeat the 'asci140' command for each new line on the paper (at another Plus/4 peculiarity. The 'asci37' will return to the normal non-graphic mode).

It is also possible to print the other graphic characters by arranging their ASCII codes together, from page 184 to 196 in the User Manual. It appears that the maximum possible number is five, and the 'graphic mode' will have had to be set first. When using two or more ASCII codes together in reverse video, separate each number from the previous one by a semicolon. You do not need to repeat the 'asci' command.

Underlining can be made by the '^' (direct) or shifted '~' (continuous), but only when the underlining itself occupies its own line on the paper. And again you may have found out by trial and error.

I have noticed that a created block will stay in memory even after you have cleared memory (cleared the screen), and can be inserted on the blank screen, which is useful if you want to retain only one paragraph of a document.

You can use the line feed to keep records of mailing list of names and addresses more easily as a wordprocessor document (saved on tape). After each segment of the address type 'asci18' in reverse video, and continue typing the remainder of the

address on the same line without pressing Return until the end of each address. Each section of the address will be printed on paper on a new line, although on the screen it appears as a continuous line. Up to 99 addresses can be stored on one document. Before pressing Return you can add 'asci30' for two extra blank lines before the next address.

Please remember that every time 'asci', followed by a number has been mentioned, it must be typed in reverse video on the screen (Control

Rev On). It should also be mentioned that all these tips may only work on Commodore type 64 Matrix printers.

I hope that some of these hints and procedures will enable many more Plus/4 owners to utilize the built-in software, which after all is quite good for the average home user. If you have neither a disk drive nor a printer, but are contemplating one or the other, take my advice - get the printer. It will widen your scope of usage much more than the disk drive.

End Addresses for Tape Saving

LINE 1 = C10C	LINE 2 = C178	LINE 3 = C108	LINE 4 = C375
LINE 5 = C368	LINE 6 = C28D	LINE 7 = C28A	LINE 8 = C347
LINE 9 = C394	LINE 10 = C387	LINE 11 = C42E	LINE 12 = C478
LINE 13 = C4C8	LINE 14 = C585	LINE 15 = C582	LINE 16 = C5A9
LINE 17 = C5FC	LINE 18 = C666	LINE 19 = C696	LINE 20 = C823
LINE 21 = C778	LINE 22 = C776	LINE 23 = C7CA	LINE 24 = C817
LINE 25 = C864	LINE 26 = C88F	LINE 27 = C8FC	LINE 28 = C948
LINE 29 = C998	LINE 30 = C980	LINE 31 = CA12	LINE 32 = CA7F
LINE 33 = CA4C	LINE 34 = CA7F	LINE 35 = CBA4	LINE 36 = CB80
LINE 37 = CC8B	LINE 38 = C1-42	LINE 39 = CC9A	LINE 40 = CC17
LINE 41 = CD04	LINE 42 = CD83	LINE 43 = CDCE	LINE 44 = CE18
LINE 45 = C188	LINE 46 = C180	LINE 47 = CF62	LINE 48 = CF4F
LINE 49 = CF9C	LINE 50 = C116	LINE 51 = D008	LINE 52 = D081
LINE 53 = D408	LINE 54 = D710		
LINE 55 = D808	LINE 56 = D71D	LINE 57 = D16A	LINE 58 = C282
LINE 59 = D094	LINE 60 = D257	LINE 61 = D266	LINE 62 = D269
LINE 63 = D138	LINE 64 = D385	LINE 65 = D3D2	LINE 66 = D419
LINE 67 = D46C	LINE 68 = D485	LINE 69 = D508	LINE 70 = D516
LINE 71 = D448	LINE 72 = D5D3	LINE 73 = D61A	LINE 74 = D687
LINE 75 = D604	LINE 76 = D721	LINE 77 = D788	LINE 78 = D788
LINE 79 = D608	LINE 79 = D855	LINE 79 = D8A1	LINE 80 = D88F
LINE 81 = D60C	LINE 82 = D869	LINE 83 = D8D4	LINE 84 = DA13
LINE 85 = D678	LINE 85 = D4-8D	LINE 87 = D8D4	LINE 88 = D857
LINE 89 = D8A4	LINE 90 = D8F1	LINE 91 = C2C8	LINE 92 = D838
LINE 93 = DCD8	LINE 94 = D825	LINE 95 = D872	LINE 96 = D848
LINE 97 = D18C	LINE 98 = D839	LINE 99 = D8A6	

Notes for Table

After going to the monitor (press re-set button, press Run/Stop) and release re-set), type:

```
^P[RENAME]^,LOC[XXX]
[RTN]
```

Type XXX (end address) from the table, where the line number is the one after the

last line in the completed document in the word processor.

To load a document from tape, enter monitor from wordprocessor as above and type:

```
^C [RTN]
```

To return to the word processor after saving or loading, key ^X [RTN] - then Ctrl ^C and ^W [RTN].

Your

Submissions

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Surname:

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Address:

Postcode: (Telephone Number):

Times to contact point:

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Computer/memory size:

Extra required (disk etc):

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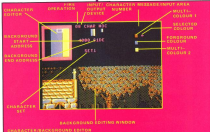
THE VAST MAJORITY OF computer programmers probably a diverse range of graphics aids. These may include screen editors, character editors or sprite editors. The only problem is that some of them can carry out all the functions that the programmer requires. Obviously, the only way around this is to use a number of programs to produce one finished product.

For example, if I was writing a game I would use a character editor to produce user defined characters. I would then use these to produce the actual background for the game. Then I would load in a sprite editor and produce the sprites. Wouldn't it be easier if it could all be done with one program which encompassed all the functions I could ever need? Hence the birth of the **3 IN 1 EDITOR**.

3 IN 1 consists of a sprite editor that has provision for multicolour and hi-res sprites. Sprites can be animated, copied, positioned on top of each other etc. Within the program there is also a combined character and background editor. What makes this part of the program so special is that you are not limited to designing just single screens but it is possible to define screens that take up to 128 of the computers memory.

The editing screens act as small windows that can be moved over a much larger area. Screens such as the ones I created in games like *Nasty on the Run* and *Fun at Bigger* are extremely easy to produce. Until now most scrolling screens were designed as individual pictures and "track" one next to the other at a later date.

The **3 IN 1 Editor** has already aroused much interest in programming circles and many programmers will be using it to help them design games that will be appearing over the next few



months. The complete editor program is published here so that it is available to anyone who is interested in graphics. This month I will detail the commands available within the editor so that you will be able to use it. In next month's issue of the magazine I will be presenting a few example backgrounds so that you can see exactly what is possible with the editor.

Getting It All In

3 IN 1 Editor is presented in the form of a series of Basic loaders. This makes it relatively easy to enter and check for typing errors. Simply type in all of the loader programs and save them on to disk or tape. If you are using tape then do make sure that you change the "A" to "J" in the LOAD instructions where indicated.

Once you have entered all of the programs and saved them individually then you can create the actual machine code file that you will use. To do this LOAD the program **"BNT LOADCRT"** and type **RUN**. This will FORN the machine code into the neces-

sary area of memory. Once the program has finished running it will automatically load the next part of the program from TAPE or DISK. You do change the numbers if using tape don't you! Once the last part of the program has been **RUN** press the space bar to enter the program. **3 IN 1 EDITOR** is now ready for use. Use option **DIS SAVE 3 IN 1 EDITOR**.

To use the editor in future you type:

LOAD "3 IN 1 EDITOR",A1 for disk
or
LOAD "3 IN 1 EDITOR",J1 for tape.

In order to start the program you then type:

SET 50000

If, while entering the programs, you made any typing errors these will be found by the individual **LOADCR** programs when they are **RUN**. If you do find any errors then you will either be presented with the line number where the error is located or an "Illegal quantity

error". The way to deal with each of these errors is detailed below.

Error in Line Number

If you get this error message then simply list the program so that you can find out in which **LOADCR** program the error occurred. Then count the line by comparing yours with the listing for that **LOADCR** and then re-save the program. Do make sure that if using tape you don't erase the program over another part and that you save it in the correct position so that it can be loaded in order.

Illegal Quantity Error

If you get this error then you have either typed in a number greater than 255 or simply mixed a number up. If you do get an error then type this line and press **RTN/DEL**:

PRINT 2048*(1%L)

The number that is printed denotes the line where the error is. Correct the line as for the above error and try again.

EDITOR

Firstly all numerical inputs and outputs are in HEX, this is because most programmers work in hexadecimal since it is a lot easier when writing machine code than using decimal, since this program was designed as a programmers tool it is obvious that it should use HEX. All inputs must be made up of two digits, eg. '00' or '0F'.

A lot of the functions can be controlled by either the cursor keys or a joystick in port two. Since the joystick only has one fire button and it may need to either start or set points, the 'F' key is used to select its operation. In both editors, a flag of either one or zero is used. One indicates that the joystick will set a point while a zero means that it will delete a point. Take a look at the labelled pictures of both editors to see where the flags are.

Next to the joystick flag in both editors is the device flag. As with the main menu this can be either an 0 or 1. Again look at the pictures in order to see where the flag can be found.



The Sprite Editor

Using the Program

Once you have loaded the program and started it running, with the SYS 5000 command as detailed above you will be presented with the editor's main menu which offers the following options:

- 1) SPRITE EDITOR
- 2) CHAR/SCREEN EDITOR
- 3) HELP SPRITES
- 4) HELP CHAR
- 5) DISK COMMANDS
- 6) DIR
- 7) DISK REPORT
- 8) SAVE EDITOR
- 9) LOAD

Pressing the corresponding key will call up the specified function. Options 1 and 2 call up the sprite editor and the character/background editor respectively. These will be explained in their own sections later on.

Options 3 and 4 give access to brief reminders of all of the functions that are available in the relevant programs. These two screens will no doubt be of great use once you start to use the program.

Option 5 allows you to send the standard disk in-

structions to your disk drive. If you are unsure of what the commands are I have listed the main ones in Figure 1.

The DIR function will display a directory listing from any disk in the drive. However, because INT only uses program files (i.e. PRG) then only this type of file is listed to the screen. Also the use of the file is not given and is not really that important.

Just in case you ever have any disk errors, I have included Option 7 which will read the error channel of the disk drive and report any errors.

Option 8 is extremely important. This function allows you to make more copies of the program without having to use the Basic loaders. If you use this function then you will be prompted for the filename that you wish to call the program by. The default output device when you load

this program is disk. If you are using tape then you will need to change the output device; this is done by pressing F1. You will be able to tell which is currently being used by output as both this option and Option 7 will have either a '1' or an '0' after them. A '1' specifies an output device of 1 i.e. cassette while an '0' means device 0 which is disk.

The final command available from the main menu is LOAD. This will LOAD the specified file into the same area of memory that it was saved from. This means that you can load any of the files created with the editor programs from the main menu.

Using the Editors

Before I take a close look at the individual editor programs it is worth pointing out a few conventions.

The sprite editor allows you to edit sprites in either multi-colour or hi-res mode. Sprites 0-100 are controlled with the editor. If you are unsure about sprite numbers then I suggest that you have read the section on sprites in the CH manual. If you take a look at the picture you will see that there is quite a lot of information on the screen.

Firstly we have the actual sprite editing screen. This displays a blown-up version of the sprite being edited. If you choose multi-colour then the horizontal resolution will be the same as with multi-colour sprites. Unlike most sprite editors you actually design the sprite using the colour key on the left. This means that you don't have to think about combinations of data produces which colour. Simply press one to three to select the colour and key preset those data with it.

Colour changing is also extremely easy. Press shift one to five and the corresponding colour will go through all 16 possibilities. Changing colour mode is also

Disk Commands

SD	Initialise disk
VB	Validate disk
FO name/d	Format disk
RS name/d old	Renome file
SL name	Scratch file

Figure 1

extremely easy simply press 'W' to enter multi-colour mode or 'H' for hi-res mode. If you want to reverse the sprite simply press CONTROL and B, (any m's ok)

It's not really worth mentioning all of the available commands since they are all listed in Figure 1. However, a few functions do need further explanation.

At the bottom right hand corner of the screen there are four sprites referred to as sprite zero to three. Note these are NOT the same as sprite numbers but are just used as reference numbers.

For the four at the bottom of the screen, (usually these four positions hold the same sprites as that which is being edited. It is possible to expand these sprites using the left arrow () and up arrow () keys so that you can see the different combinations of sprite available. To alter the way that the sprite looks simply pass one of the above keys followed by the corresponding sprite position number (0-3).

Pressing CONTROL AND P followed by a number allows you to move that numbered sprite around the

bottom of the screen. This means that you can position the four sprites next to each other at even overlap them. This may not seem all that useful at first but it is possible to make each of those four sprites different. This means that you could define a large character of up to four sprites joining the sprites together at the bottom of the screen so that you can see what they look like. It is even possible to animate this section of the screen with the CONTROL, N command and the Q and B keys. Pressing CONTROL and N followed by 00 will cause each of the four sprites at the bottom of the screen to become the same as the one being edited. If on the other hand after typing CONTROL and N you enter a number greater than 00 you can set up animations.

Animation is quite difficult to explain and is best figured out with practice. However I will do my best to explain how to set up and use this special animation function.

When you enter a number greater than 00 for the number of animations after a CONTROL, N instruction the sprites at the bottom of the screen will change. If, for example, we had pressed 01 after CONTROL, N, sprite 0 would be the same as the actual sprite 0A0. Sprite 01 will be the same as 0A1, sprite 02 will be the same as 0A2 etc. If we now press the keys B and Q we can increment and decrement the sprite numbers at the bottom of the screen giving the appearance of animation. If we press 'W', Sprite 01 will become actual sprite 0A1, Sprite 02 will become actual sprite 0A2 etc. If we had entered 01 after a CONTROL, N instruction then the sprites would be incremented by four every time you pressed the 'W' key. I.e. sprite 01 would become 0A4, Sprite 02 would become 0A8 etc.

I did say that this form of animation was complicated but if you try it then I'm sure that it will all fall into place.

Just in case you have problems with this type of animation there is a simpler form. This is the 'A' instruction. This instruction will change all the sprites on the screen, including the

large editing screen, in increments of one for a preset length. When you press 'W' you will be prompted at the top of the screen for the first sprite in the sequence and the last, then the sprites will be displayed in order. Pressing 'T' and 'V' will speed up and slow down the speed of this animation.

That just about sums it up for the sprite editor. I'm sure that you will find it very easy to use with a little practice and that you will find most of the instructions that you are even likely to need.

Character Screen Editor

Each of these editors are present on the same screen. The top half is the character editor while the bottom is used as a small window (not a larger screen).

Quite a lot of information is present on this screen and it is worth studying the commented picture in order to find where everything is.

For more experienced programmers I have included the provision of using two different character sets. In order to use the second set you must set up an interrupt raster on the graphics editing screen with the 'P' command while inside the background editor. Above the raster, character set one will be displayed, while below the raster you will be in the second character set. Character set one sits at \$0000 and set two is at \$0080.

Again it is worth looking at some of the available commands in more detail, a summary of them all can be found in Figure 1.

As with the sprite editor, characters can be edited in either multi-colour or hi-res mode, colours being chosen and changed as in the sprite editor.

Once you have entered a character you can place it anywhere within a defined background in the background editor. The 'T' key is used to move control between either the character editor or the background editor. You can see which mode you are in by seeing which cursor is flashing.

The background is defined with the CONTROL, D command and the window

Sprite Editor Commands

Cursor/ joystick	Move cursor
*HOLD 1	Draw point
space/HOLD 0	Delete point
B	Joystick fire function
M	Multi-colour mode
H	Hi-res mode
B-B	Select drawing colour
	N.B. only colour 2 can be used in hi-res.
	1 = Multi-colour 1
	2 = Multi-colour 2
	3 = Multi-colour 3
SHIFT 1-0	Change colour
	4 = Background colour
	5 = Background
G	Get sprite number
C	Copy sprite number
=	Increase sprite number
-	Decrease sprite number
U	Move sprite up
D	down
L	left
R	right
DEL	Scroll row left
SHIFT DEL	Scroll row right
SHIFT HOME	Clear sprite
X	X-flip
Y	Y-flip
A	Animate
	Input F: from
	T: to
	Press F for faster
	S for slower
CTRL L	LOAD data
CTRL S	SAVE sprite data
B	Input/Output device

SPRITE BLOCK FUNCTIONS

CTRL P (B-B)	Position sprite with cursor keys
(B-B)	Expand sprite Y direction
(B-B)	Expand sprite X direction
CTRL N (N)	Animate group of N
	N=00 display entire sprite
	Q - decrease step
	B - increase step
STOP	Goto main menu

Figure 1

CHARACTER/SCREEN EDITOR

Cursor/joystick	Move cursor
*FIRE 1	Open point
space/FIRE 2	Delete point
F1	Joystick fire function
M	Multicolor mode
H	Hi res mode
T-1	Select drawing colour
SHIFT T-2	Change colour
	0 = foreground colour
	1 = background
G	Get character number
C	Copy character number
+	Increase character number
-	Decrease character number
U	Move character up
D	down
L	left
R	right
SHIFT HOME	Clear character
S	Change character set
	(0) 0000
	(1) 1000
CTRL F	Fetch character set to editor
	DO = 8000 characters
	OB = 0011
	20 = SET 2
X	8-Bit
T	8-Bit
CTRL R	Reverse character
BB	Input/Output device
CTRL L	LOAD data
CTRL S	SAVE character data
	Input start and end character for save
CTRL D	Define background size
CTRL B	Define start of window
	BL = High byte
	BL = Low byte
B	Define border character
Z	Jump to background editor
STOP	Go to main menu

BACKGROUND EDITOR

Cursor/joystick	Move cursor
*FIRE	Place character
G	Get character
+	Increase character number
-	Decrease character number
CTRL F	Fill window with character
W	Go to full size display cursor
	help menu screen W
P	Position cursor
	0000 bottom of screen
	0000 at that character position
CTRL L	LOAD data
CTRL S	SAVE background data
J	jump back to character editor

Figure 1

can be anything from two by two characters upwards, the maximum in either direction being 255 characters or 65535. Obviously your screen size is limited by the amount of memory available. If there is not enough room for your window then you will have to enter new values. I have made up to 128 of memory available for the window though I'm sure that you will find that you very rarely use this much. The two numbers in the middle of the screen show you where your window starts and finishes in memory.

One very important consideration for games programmers is where they are actually going to put their screen. The **CONTROL B** command will prompt you for the high byte and low byte for your screen position so that you can move it where you want. Do make sure that you don't overwrite any other programs in memory, such as the editor.

You may think that it is a little limiting to just use a small section of your total graphics screen at one time. I have therefore included the **W** command which will switch to a full screen display in which you can move around the background, movement being controlled by the cursor keys only.

It is possible to set up a border character which is displayed around the smaller editing window. I usually leave this blank though you may try different effects by putting fancy borders around the screen. This does not apply to full screen mode.

Saving and Loading

As I said earlier, it is possible to load any type of file into memory from the main menu. It is also possible to load any type of file from within any of the other editors as well. However the I/O device is separate in each editor so you must change it in each section of the program.

Even though you can **LOAD** in any type of data from within any section of the program, you can only save each type of data from the correct editor. You must therefore be in the character editor in order to **SAVE** your

user defined graphics. You must be in the sprite editor to save sprites and you must be in the background editor in order to save backgrounds.

Note

When you design a background, make sure that you keep a note of the screen size that is defined, since a screen that is supposed to be 20 characters wide will look rather silly if the screen is set to 21 characters.

Examples

Since there is probably quite a lot of information to grasp about the editor in this issue of the magazine I will leave it there. Next month I will be giving you some sample screens, which you can see in the photographs accompanying this article, together with some more hints and tips about how to use the program.

I'll be willing to double be updated continually. I will try to put updates in *Your Commodore* when they are available. In the meantime if you have any ideas or comments about this program then please write to me c/o *Your Commodore* and it will be forwarded to me.

I hope that you find the program as useful as many programmers have already done.

Stop Press

Since the test for this article was originally sent, the **EDIT 1 EDITOR** has been improved.

The main improvement is the addition of a pull down menu facility for accessing the commands. If you press the **F2** key, whilst in any of the editors, a list of the available functions will be displayed. Move the selector up and down the list and press **RETURN** to select the option that you require.

A **CHAR** option has also been added. This will allow you to copy large areas of the background screen with ease as well as copy sprites into characters and vice versa. These functions are described in the **HELP** sections of the program and I will explain them in more detail next month.

[illegible]

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 2020 047069, 162, 2042
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 2020 047090, 177, 8, 194, 227, 8, 20, 172, 3, 194, 221, 76, 4, 1, 2, 4, 1728
 2020 047091, 41, 42, 4, 89, 81, 42, 4, 8, 4, 0, 173, 44, 1, 20, 204, 70

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3into1 EDITOR

10071

2990 247376,76,33,87,79,87,1
2,82,72,71,72,84,11,13,82,78
10072

2990 247377,76,33,79,79,7
7,89,84,87,76,84,82,80,32,7
10074

2991 247488,82,79,84,88,12,1
2,82,82,78,87,82,84,79,88,84
10076

2992 247479,79,89,79,72,72,8
8,79,78,32,77,84,79,82,13,87
10078

2993 247479,79,84,88,82,79,8
8,32,88,79,87,78,32,87,72,78
10079

2994 247488,79,87,12,31,12,2
9,88,82,87,82,82,32,82,88,82
10080

2995 247487,88,32,88,79,12,8
7,79,78,84,72,78,88,88,8,1,8
71

2996 247487,87,71,82,82,87,
81,87,82,87,88,78,32,87,88,7
10081

2997 247489,79,82,12,72,78,7
8,79,12,12,87,82,82,87,74
10082

2998 247479,87,88,87,82,82,8
2,32,77,79,88,87,71,88,78,84
10083

2999 247482,82,87,78,72,82,8
8,84,84,88,82,82,87,32,88,71
10084

3000 247488,87,78,32,82,88,8
8,87,87,87,78,72,82,87,88,84
10085

3001 247488,84,78,88,84,88,2
1,88,71,88,88,78,12,31,88,84
10086

3002 247488,79,78,72,88,12,8
8,84,87,79,78,72,88,12,12,78
10087

3003 247444,71,79,84,79,32,8
1,72,82,81,32,78,32,77,84,88
10088

3004 247482,12,82,12,87,84,8
1,77,88,87,32,87,72,88,82,32
10089

3005 247478,87,79,88,88,82,2
1,82,11,12,78,88,84,78,79,88
10090

3006 247482,84,77,87,72,78,7
1,82,87,32,88,88,82,88,88,78
10091

3007 247482,88,88,88,88,82,8
8,87,11,12,82,84,78,78,87,82
10092

3008 247489,82,82,88,31,87,7
2,82,82,12,78,82,77,84,88,82
10093

2990 247478,82,84,87,88,87,8
1,89,82,81,88,32,87,72,88,82
10094

2991 247482,78,88,71,88,88,8
2,12,12,82,84,88,71,88,78,71
10095

2992 247488,32,87,72,72,82,2
2,87,88,88,12,88,87,71,78,88
10096

2993 247488,88,88,32,87,78,8
1,38,30,88,88,88,12,12,78,88
10097

2994 247482,88,82,82,31,88,8
8,82,87,88,32,84,78,32,87,78
10098

2995 247488,88,78,78,88,88,2
1,87,12,88,82,12,88,87,79,78
10099

2996 247489,88,88,88,32,87,8
8,82,82,72,72,79,84,32,88
10100

2997 247482,32,88,87,72,87,7
8,71,88,32,87,79,78,78,82,82
10101

2998 247482,12,12,87,88,82,7
8,32,82,88,78,78,84,88,82,82
10102

2999 247482,87,78,78,82,82,2
2,12,82,88,87,87,82,79,78,78
10103

3000 247482,87,78,88,88,32,2
2,88,88,12,88,88,88,87,87,87
10104

3001 247482,78,88,88,87,78,8
8,32,82,88,82,78,79,32,88,12
10105

3002 247482,78,88,88,88,82,7
8,88,32,88,78,87,78,32,87,78
10106

3003 247478,88,78,87,12,12,1
1,28,88,82,87,82,82,32,88,88
10107

3004 247482,87,88,32,88,79,1
1,87,78,78,88,72,78,88,87,88
10108

3005 247487,12,87,71,88,82,
32,78,88,88,87,72,84,32,88,8
8,10109

3006 247482,88,79,71,32,88,2
8,82,87,88,84,87,32,32,88,82
10110

3007 247482,88,84,38,12,12,8
2,72,72,79,84,32,72,79,77,88
10111

3008 247484,87,78,88,88,82,2
2,87,72,82,82,12,12,88,88,78
10112

3009 247487,82,84,78,88,84,7
1,78,84,78,32,72,88,78,78,12
10113

3010 247478,88,78,82,12,12,7
2,78,78,78,88,12,12,78,78,78,78

8,88,78,82,77,88,72,84,78,32
10114

3000 247487,78,78,88,78,82,1
2,12,32,32,87,82,87,82,87,78
10115

3001 247479,88,88,71,78,88,8
8,77,87,82,82,82,12,12,32,32
10116

3002 247482,87,78,78,88,88,4
8,82,82,88,32,87,72,88,82,12
10117

3003 247482,32,71,88,71,88,8
8,32,87,78,88,82,12,12,32,32
10118

3004 247482,88,71,78,87,82,8
8,88,87,88,87,72,82,82,32
10119

3005 247478,88,71,12,88,82,1
2,32,32,72,88,87,87,82,88
10120

3006 247482,82,88,12,87,71,8
8,32,32,78,88,71,88,88,12
10121

3007 247482,78,88,88,88,88,71,7
8,87,88,8,117,12,12,32,32,78
10122

3008 247488,12,88,78,88,71,7
8,87,88,8,117,12,12,32,32,78
10123

3009 247488,12,88,78,88,71,7
8,78,12,88,72,88,82,32,88,88
10124

3010 247482,84,78,82,12,12,2
2,12,87,88,88,72,88,78,82
10125

3011 247488,12,12,88,78,78,2
2,82,87,88,88,88,78,32,87,78
10126

3012 247478,88,78,87,12,12,2
2,32,32,78,32,87,88,87,88
10127

3013 247477,78,88,88,32,82,82,
1,78,88,78,88,12,12,32,32
10128

3014 247482,32,87,88,88,88,7
1,84,12,12,78,88,87,78,88,88
10129

3015 247482,84,78,78,87,78,8
2,12,78,78,32,88,71,88,32,87
10130

3016 247478,78,88,78,87,12,1
2,32,32,32,78,12,88,82,88,88
10131

3017 247482,87,88,82,88,88,8
8,32,88,78,88,88,12,12,32,32
10132

3018 247478,78,81,88,88,88,8
8,32,87,78,78,88,78,87,32,82
10133

3019 247478,78,87,12,12,32,12
2,78,78,78,88,88,78,78,78,78

10134

3020 247488,84,32,88,78,78,1
7,78,12,12,12,78,88,88,88,88
10135

3021 247482,12,88,88,82,87,8
8,32,88,78,32,87,78,78,88,78
10136

3022 247478,88,88,88,12,12,12
1,78,78,78,88,88,88,32,88,78
8

3023 247487,87,78,81,82,82,18
8,88,12,71,12,12,88,88,88,88
10137

3024 247482,32,32,12,78,84,1
78,32,12,32,32,32,12,12,32,32
10138

3025 247488,84,32,12,12,88,78
32,12,88,12,32,32,12,12,12,12
10139

3026 247488,78,88,88,12,78,12
12,78,32,32,32,32,12,12,12,12
10140

3027 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10141

3028 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10142

3029 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10143

3030 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10144

3031 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10145

3032 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10146

3033 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10147

3034 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10148

3035 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10149

3036 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10150

3037 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10151

3038 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10152

3039 247488,12,12,12,12,12,12
12,78,32,32,32,32,12,12,12,12
10153

3040 247488,12,12,12,12,12,12

DICTIONARY

An imish 128 utility

by M E Catley.

DICTION 128 IS A BASIC utility program for the C128 Computer for use with a CBM 7041 or CBM 1071 disk drive.

Carefully type in the program, which MUST be saved before running as it will over-write itself. It is fully error trapped, and on completion will ask for a filename. This is the name under which the machine code will be saved and subsequently loaded as a basic program.

When run, you will see a menu/help page giving all the commands and their syntax. This page can be recalled at any time by pressing "M". All commands need to be followed by pressing the return key.

A word of warning. Some of the commands incorporated into the disk monitor write-directly to disk track/sector. It is always worth making a back-up copy of the disk before starting, as any error could prove catastrophic.

Commands

- M** - Re-display the main menu/help page.
- R XX XX** - READ a track/sector directly off the disk into a buffer in the computer. This command will enable any track/sector of the disk to be read into the buffer where it can be viewed, altered or prepared for saving back on the disk.
- W XX XX** - WRITE a track/sector from the computer buffer directly on to the disk. This command enables data in the buffer, be it typed in from the keyboard or read off the disk and modified, to be recorded on to the specified track/sector of the disk.
- M XX XX** - Display memory from the buffer. One sector of data consists of 256 bytes. This command will enable all or any of these bytes to be displayed on the screen. The first hex number is the first byte to be displayed, whilst the second is the final byte. Due to the size of the screen in 40 columns mode, not all 256 bytes can be simultaneously displayed. The display will show the hex contents of the buffer and the ASCII contents providing these are printable, i.e. ASCII codes between 32 and 127 are printed, others being replaced with a period.
- MM** - This is a variant of the memory command and is a short hand method of displaying a screenshot of memory starting at the top of memory (000) down to (0FF).
- MB** - This is similar to the MM command, but displays the bottom of the buffer from (000) to (0FF).
- E** - The semi-colon command enables on-screen editing of the buffer. When the memory display commands are used, the buffer contents are displayed on the screen preceded by semi-colon. This enables on-screen editing to take place, so that when the cursor is placed over a byte and the byte is modified, the buffer contents are also modified ready for saving back to disk.
- EE** - This is the command that reads the disk error channel and displays it on the screen. Any time the error light flashes on the disk drive, pressing "EE" will clear the error indication and display the error number, error type, error track and error sector.
- +** - When a track/sector has been read into the computer buffer, the first two bytes contain the track and sector respectively of the next block of the file. If this is the last block in the file, the track value is zero. This command will read the track and sector values of the next block and load that block into the buffer, displaying which track and sector is involved. A track value of zero indicates the last block of the file has been loaded.
- ED** - This command will read the disk directory, displaying the track and sector of the first block of the file, the length of the file, the filename, and the file type. It will display

all file types, including deleted files which facilitates the recovery of files that have been inadvertently scratched, providing that no writing has been done to the disk since the scratch. The directory is displayed in blocks of up to 16 files, and finishes with the number of blocks left, as always in hex.

- T** - TRACE will, as its name suggests, trace a file on a disk and display the sequence of track/sector in the order in which it was saved. The requested filename must be correct, and no wildcards are allowed.
- S** - SET to Basic.
- L** - LOCK or write protect the disk. This command will render the disk write protected without the use of a writeprotect tab (which always fails aft). Any attempt to save a file on a disk so protected, results in error FA, DISK FRT error message.
- U** - UNLOCK or write enable the disk. This command is the opposite of the LOCK command and renders the disk write enabled, overcoming the software protection afforded by LOCK.
- J** - On the CBM 1001 and CBM 1041 disk drives, when the file type byte in the disk directory has bit six set, the file cannot be scratched by the BASIC 7-command. SCRATCH or by BASIC 7's DIRDIR&T, "M-filename" clones. This condition is indicated in a directory listing by a "<" character next to the filename. The J command sets bit six of all the files in the directory and to render them individually protected against scratch.
- K** - The K-command is the opposite of the J command, and resets bit six of all the files in the disk directory enabling deletion from the directory by conventional means.
- A** - The A-command is similar to the J command, but only operates on one named file in the directory. Again, the filename must be correct and no wildcards are allowed.
- B** - The B command is once more the opposite of the A command and will enable one named file to be unprotected in the directory.

Used with care, the disk monitor can be of considerable assistance in the management of a disk library. However, careless use can have disastrous results, so always ensure you have a back-up of your disk.

Happy disk monitoring!

PROGRAM PROGRAM: DIMON 128 LOAD

```

10 DATA 1001
20 DATA 08,1C,0A,00,9E,37,31,38,31,0
0,00,00,AD,00,8C,20,00,8C,21,00,0539
30 DATA 20,7D,FF,93,99,12,20,20,20,2
0,20,20,20,20,20,20,20,20,20,0497
40 DATA 20,44,43,40,4F,4E,20,20,31,3
2,38,20,20,20,20,20,20,20,20,20,0388
50 DATA 20,20,20,20,20,20,20,20,43,29,2
0,31,39,38,38,20,20,4D,2E,20,43,036A
60 DATA 41,54,4C,45,59,20,52,49,4
3,48,4D,4F,4E,44,20,20,4E,2E,20,04E7
70 DATA 59,4F,53,48,53,20,9E,60,59,1
8,85,24,59,02,85,53,59,00,85,56,08A9
80 DATA 59,27,65,E7,20,7D,FF,93,6D,2
0,20,20,99,12,43,4F,4E,40,41,4E,073E
90 DATA 44,20,53,55,4D,4D,41,52,59,2
0,20,28,58,58,20,3D,20,48,43,58,050C
100 DATA 20,4E,55,4D,42,45,52,28,92,
0D,0D,9E,4D,20,20,20,20,20,20,0485
9
110 DATA 20,52,45,2D,44,49,53,5D,4C,
41,59,20,54,48,49,53,2D,4D,45,4E,055
2
120 DATA 55,0D,52,20,58,58,20,58,58,
2D,20,52,45,41,44,2D,53,45,43,54,04F
7
130 DATA 4F,52,2D,20,28,54,52,41,43,
4B,20,41,4E,44,2D,53,45,43,54,4F,050
7
140 DATA 52,29,57,20,58,58,20,58,58,
20,20,57,52,49,54,45,2D,53,45,43,055
8
150 DATA 54,4F,52,2D,28,54,52,41,43,
4E,20,41,4E,44,2D,53,45,43,54,4F,054
3
160 DATA 52,29,4D,20,58,58,20,58,58,
20,20,44,49,53,5D,4C,41,59,2D,42,052
6
170 DATA 55,46,46,45,52,20,28,53,54,
41,52,54,20,41,4E,44,20,45,4E,44,053
8
180 DATA 29,20,4D,54,20,20,20,20,20,
2D,20,44,49,53,5D,4C,41,59,2D,42,044
2
190 DATA 55,46,46,45,52,20,28,24,30,
2D,20,54,4F,2D,24,41,46,29,0D,4D,045
5
200 DATA 42,20,20,20,20,20,20,20,44,
49,53,5D,4C,41,59,20,42,55,46,46,047
8
210 DATA 45,52,20,28,24,35,30,2D,54,
4F,2D,24,46,46,29,0D,28,2D,2D,03B
C
220 DATA 20,20,20,20,2D,20,4E,45,58,54,
2D,53,45,43,54,4F,52,2D,49,4E,2D,04A
E
230 DATA 46,49,4C,45,0D,4D,20,20,3D,
2D,20,25,20,2D,53,45,41,44,2D,44,03E
D

```

240 DATA 40,53,48,20,45,52,52,4F,52,
 20,43,48,41,4E,4E,45,45,50,44,20,051
 B
 250 DATA 20,20,20,20,20,20,20,50,52,
 49,4E,54,20,44,49,52,49,43,54,4F,049
 7
 260 DATA 52,59,00,54,20,20,20,20,20,
 20,20,20,54,52,41,43,49,20,50,52,043
 D
 270 DATA 4F,47,52,41,40,00,38,20,20,
 20,20,20,20,20,20,45,59,49,54,20,043
 5
 280 DATA 54,4F,20,42,41,53,49,43,00,
 4C,20,20,20,20,20,20,20,20,57,52,043
 7
 290 DATA 49,54,45,20,50,52,4F,54,49,
 43,54,20,44,49,53,48,00,53,20,20,051
 D
 300 DATA 20,20,20,20,20,20,57,52,49,
 54,45,20,49,4E,41,42,4C,43,20,44,047
 5
 310 DATA 49,53,48,50,4A,20,20,20,20,
 20,20,20,20,4C,4F,49,48,20,41,4C,041
 4
 320 DATA 4C,20,49,49,4C,45,53,0D,4B,
 20,20,20,20,20,20,20,20,55,4E,4C,042
 6
 330 DATA 4F,43,45,20,41,4C,4C,20,46,
 49,4C,45,53,0D,41,20,20,20,20,20,045
 7
 340 DATA 20,20,20,4C,4F,43,48,20,41,
 20,46,49,4C,45,0D,42,20,20,20,20,03F
 9
 350 DATA 20,20,20,20,53,4E,4C,4F,43,
 48,20,41,20,46,49,4C,45,0D,3B,20,045
 5
 360 DATA 20,20,20,20,20,20,20,20,53,43,
 52,49,49,4E,20,4D,4F,44,49,46,59,048
 6
 370 DATA 20,42,55,46,46,45,53,0D,00,
 20,59,22,A2,00,A9,2A,20,CA,20,A9,05B
 7
 380 DATA D0,8D,01,02,20,DD,20,C9,2A,
 F0,F9,C9,20,F0,F3,AE,50,29,CA,D0,0A5
 5
 390 DATA B1,29,D0,0F,8E,60,02,8A,0A,
 AA,BD,91,29,48,BD,90,29,48,80,CA,07F
 E
 400 DATA 10,E9,4C,C9,1E,83,60,8D,02,
 02,20,DD,20,C9,29,DD,09,20,DD,20,07E
 2
 410 DATA C9,20,D0,0F,18,60,20,20,1F,
 0A,0A,0A,0A,8D,02,02,20,D0,29,29,049
 D
 420 DATA 20,1F,00,02,02,38,40,C9,3A,
 00,29,0F,20,9D,02,59,09,60,20,DD,04B
 B
 430 DATA 20,20,FE,1E,90,1D,60,A9,08,
 20,DD,20,20,FE,1E,90,12,8D,AA,0B,07B
 7
 440 DATA 60,20,33,1F,20,7C,20,A9,31,
 20,03,23,20,34,20,4C,C9,1E,20,33,059
 C
 450 DATA 1F,20,7C,20,20,6B,25,A9,32,
 20,4C,20,20,34,20,4C,C9,1E,03,97,062
 5
 460 DATA 20,EC,20,B9,60,6C,20,3B,20,
 C8,D0,03,EE,01,02,C8,97,D0,ED,60,08F
 2
 470 DATA AD,01,02,D0,06,CC,04,03,B0,
 D1,60,48,88,4C,C9,1E,20,8F,20,A9,073
 E
 480 DATA 3B,A2,2A,4C,CA,20,98,38,E9,
 0B,A8,A2,20,A9,12,20,CA,20,A2,00,07D
 7
 490 DATA 30,60,0C,29,7F,C9,20,B9,02,
 A9,2E,20,D2,FF,A9,60,85,F4,C8,CA,098
 4
 500 DATA D0,EA,A9,92,4C,D2,FF,4C,7D,
 1C,AD,00,8C,D3,02,88,8C,04,02,20,086
 3
 510 DATA CF,FF,C9,54,D0,0B,AD,20,6C,
 04,02,4C,0A,20,C9,42,D0,0B,AD,50,08E
 8
 520 DATA 9C,03,02,4C,0A,20,C9,5D,F0,
 05,20,FE,1E,9D,12,8D,03,02,20,CF,07D
 1
 530 DATA FF,C9,0D,F0,08,20,FE,1E,90,
 03,8D,64,02,AC,03,02,20,85,1F,20,0AC
 4
 540 DATA 95,1F,98,20,8B,20,20,EC,20,
 A9,08,20,4F,1F,20,9F,1F,4C,0D,20,062
 9
 550 DATA 20,FE,1E,90,03,99,00,0C,C8,
 C8,97,60,20,FE,1E,90,13,A8,A9,08,089
 1
 560 DATA 85,97,20,DD,20,20,DD,20,20,
 23,20,D0,F0,20,9F,1F,4C,C9,1E,8D,062
 1
 570 DATA 74,20,AD,A9,0B,20,AE,20,8E,
 7B,29,6D,7C,29,AD,AA,0B,20,AE,20,07A
 0
 580 DATA 6E,7E,20,8D,7F,29,A2,0F,20,
 C9,FF,A2,00,B9,73,29,20,D2,FF,D0,09D
 7
 590 DATA E0,00,D0,F0,4C,CC,FF,A9,0F,
 A8,A2,0B,20,BA,FF,A9,02,A2,70,AD,08D
 9
 600 DATA 29,20,B0,FF,20,C0,FF,A9,00,
 A8,A2,0B,20,BA,FF,A9,01,A2,72,AD,082
 3
 610 DATA 29,20,B0,FF,4C,C8,FF,A9,00,
 20,C3,FF,A9,0F,4C,C3,FF,A2,30,20,0A7
 8
 620 DATA E9,0A,9D,03,E8,B0,F9,69,3A,
 60,48,4A,4A,4A,4A,20,D3,20,AA,88,08A
 F
 630 DATA 39,0F,20,D3,20,48,8A,20,D2,
 FF,68,4C,D2,FF,10,49,FE,9D,02,69,09D
 5
 640 DATA 06,69,3A,60,20,CF,FF,C9,0D,
 D0,F8,68,68,4C,C9,1E,89,6D,2C,A9,092

```

3
650 DATA 20,4C,D2,FF,AD,03,B9,1B,29,
F0,06,20,D2,FF,CB,D0,F5,AD,0D,0C,DAD
A
660 DATA 0D,A9,0B,4B,3D,BB,3D,4B,F0,
D9,A0,03,B9,32,39,F0,06,20,D2,FF,095
3
670 DATA C8,D0,F5,AD,01,0C,8D,AA,0B,
3D,BB,3D,4C,4D,1F,2D,7C,2D,A2,0F,07A
9
680 DATA 2D,C3,FF,A2,0D,8D,6A,29,2D,
D2,FF,E8,D9,0A,D0,F5,2D,CC,FF,A2,0BE
B
690 DATA 0F,2D,C6,FF,A2,0D,3D,CF,FF,
9D,6D,21,E8,D9,17,D0,F5,2D,CC,FF,0B3
E
700 DATA A9,61,85,8C,8D,AA,0B,A9,12,
8D,A9,0B,3D,7D,FF,93,11,99,92,2D,68B
4
710 DATA 2D,2D,2D,2D,2D,2D,2D,12,2D,
2D,2D,2D,2D,2D,2D,2D,2D,2D,2D,027
2
720 DATA 2D,2D,2D,2D,2D,2D,2D,2D,2D,
2D,2D,0D,9A,92,11,54,52,2D,2D,53,03E
3
730 DATA 4D,2D,2D,4C,4D,2D,3D,54,49,
54,4C,4D,2D,2D,2D,2D,2D,2D,2D,2D,03B
B
740 DATA 2D,2D,2D,34,59,5D,45,2D,2D,
2D,2D,2D,2D,2D,2D,C5,C5,C5,C5,C5,6B7
B
750 DATA C5,C5,C5,C5,C5,C5,C5,C5,C5,
C5,C5,C5,C5,C5,C5,C5,C5,C5,0F6
4
760 DATA C5,C5,C5,C5,C5,C5,C5,C5,C5,
C5,C5,C5,C5,C5,9E,0D,2D,4E,12,0CB
9
770 DATA AD,A9,0B,F0,19,2D,8F,32,2D,
4E,22,AD,A9,0B,F0,0E,2D,8F,32,AD,07A
B
780 DATA A9,0B,F0,06,2D,59,32,4C,5D,
21,2D,89,3D,A2,0F,2D,C9,FF,A2,6D,077
3
790 DATA B0,64,29,2D,52,FF,E8,ED,0A,
D0,F5,2D,CC,FF,A2,0F,2D,C8,FF,2D,CB4
F
800 DATA CF,FF,4B,2D,CF,FF,2D,CF,FF,
4B,2D,CC,FF,A9,24,2D,D2,FF,6B,2D,CB4
B
810 DATA BB,2D,4B,2D,BB,2D,2D,7D,FF,
2D,42,4C,4F,43,4B,53,2D,4B,52,45,06B
5
820 DATA 4D,0D,0D,2D,34,2D,A9,0D,85,
8C,4C,C6,1E,AD,A9,0B,F0,05,A9,31,075
3
830 DATA 2D,4C,2D,6D,2D,7D,FF,11,2D,
2D,2D,2D,2D,2D,2D,12,96,5D,52,45,05D
B
840 DATA 53,53,2D,41,4E,59,2D,4B,4B,
59,2D,54,4F,2D,43,4F,4E,54,49,4E,056
3
850 DATA 55,45,9E,92,9D,2D,84,FF,F0,
F8,4B,A9,93,2D,D2,FF,4B,5D,A9,6D,0A9
E
860 DATA 6D,A5,0B,85,FD,A2,0D,2D,C8,
FF,2D,CF,FF,8D,A9,0B,2D,CF,FF,8D,CB0
D
870 DATA AA,0B,E8,FD,E8,FD,2D,CF,FF,
85,FC,A5,FD,85,FF,2D,CF,FF,FD,0C,0DF
A
880 DATA 8D,F9,29,2D,CF,FF,8D,FA,29,
4C,C8,32,2D,CF,FF,E8,FD,84,FD,AQ,0CD
7
890 DATA D0,2D,CF,FF,E8,FD,99,8D,0B,
C8,1B,C0,1D,9D,F2,A9,F3,2D,CF,FF,0BE
5
900 DATA 99,0B,29,E6,FD,A5,9D,F0,03,
8D,A8,0B,C8,D0,EE,A5,FC,D9,0C,AD,0BC
5
910 DATA 8D,0B,D0,07,AD,A8,0B,D0,1B,
F0,A9,A5,8C,FD,03,2D,3D,23,AD,A7,095
9
920 DATA 0B,F0,03,2D,1B,23,AD,A8,CB,
F0,95,2D,CC,FF,6D,8D,0D,89,AC,CB,0B9
9
930 DATA F0,0B,D9,8D,0B,D0,07,C8,D0,
F3,EE,A8,0B,6D,A9,0D,8D,FC,6D,AD,0B3
3
940 DATA F9,29,2D,AE,23,AD,FA,29,2D,
AE,23,AD,04,2A,2D,AE,23,89,8D,0B,0B2
1
950 DATA F0,0B,2D,D2,FF,C8,D0,F5,A5,
FC,29,07,A8,89,F4,29,8D,59,23,2D,0AE
C
960 DATA D0,29,A5,FC,29,4D,FD,07,A2,
4B,A9,3C,2D,C8,2D,A2,0D,A9,9E,4C,0B9
3
970 DATA CA,2D,2D,CC,FF,2D,A4,2D,2D,
E9,2D,A9,9A,A2,0D,2D,CA,2D,A9,0F,0B9
3
980 DATA A8,A2,0B,2D,8A,FF,A9,0D,2D,
8D,FF,2D,C0,FF,A2,0F,2D,C8,FF,2D,6A4
5
990 DATA CF,FF,2D,D2,FF,C9,D0,D0,F8,
2D,CC,FF,2D,A4,2D,A9,9E,A2,0D,2D,CB4
D
1000 DATA CA,2D,4C,C9,1E,2D,BB,2D,A9,
2D,AA,4C,CA,2D,A9,42,3C,A9,41,8D,0B
4F
1010 DATA 2D,24,8D,3C,24,2D,7D,FF,93,
11,2D,2D,49,4E,53,45,52,54,2D,44,05
F1
1020 DATA 49,53,4B,2D,49,4E,2D,44,53,
49,54,45,2D,2D,2D,2D,96,12,41,92,05
33
1030 DATA 2D,54,4F,2D,41,42,4F,52,54,
9E,0B,0D,2D,59,23,C9,41,D0,03,4C,05
CA
1040 DATA E4,2D,2D,7C,2D,2D,EC,2D,A9,
31,2D,4C,2D,A2,0F,2D,C9,FF,A2,0D,07
93
1050 DATA 8D,5C,29,2D,D2,FF,E8,ED,07

```

1090 FF,20,CC,FF,A2,02,88,FF,20,3B,08,36
 1090 DATA 30,A2,0D,20,C9,FF,A9,00,20
 ,D2,FF,20,CC,FF,A2,A6,86,FF,20,3B,0A
 6C
 1070 DATA 28,A2,00,20,C9,FF,A9,00,20
 ,D2,FF,20,CC,FF,20,EC,26,A9,32,20,09
 71
 1080 DATA 4C,20,4C,B4,20,A9,12,8D,00
 ,0C,A9,01,8D,01,0C,20,7C,20,AD,00,05
 7D
 1090 DATA 0C,F0,EB,8D,A9,08,AD,01,0C
 ,8D,AA,0B,A9,31,2D,05,25,A9,02,AA,08
 1D
 1100 DATA BD,00,0C,F0,05,EA,EA,9D,00
 ,0C,8A,38,69,20,9D,EF,2D,6B,25,A9,06
 3E
 1110 DATA 32,8D,74,39,2D,67,20,20,18
 ,29,AE,7B,29,AD,7C,39,2D,CA,2D,2D,06
 35
 1120 DATA 32,29,AE,7E,29,AD,7F,29,2D
 ,CA,2D,4C,5B,24,2D,7D,FF,93,0D,2D,07
 36
 1130 DATA 2D,2D,2D,2D,2D,2D,2D,2D,2D
 ,2D,2D,2D,12,4C,4F,43,4B,2D,41,4C,03
 68
 1140 DATA 4C,2D,4B,49,4C,4B,53,92,0D
 ,0D,A9,09,8D,76,24,A9,4D,8D,77,24,06
 68
 1150 DATA 2D,59,32,2D,4E,24,2D,7D,FF
 ,0D,0D,2D,2D,2D,2D,2D,2D,2D,2D,12,03
 F5
 1160 DATA 41,4C,4C,2D,4B,49,4C,4B,53
 ,2D,41,52,4B,2D,4E,4F,57,2D,4C,4F,05
 93
 1170 DATA 43,4B,4B,44,92,9E,0D,0D,4C
 ,06,1E,2D,7D,FF,93,0D,2D,2D,2D,2D,06
 4D
 1180 DATA 2D,2D,2D,2D,2D,2D,2D,2D,12
 ,53,4E,4C,4F,43,4B,2D,41,4C,4C,2D,03
 F7
 1190 DATA 4B,49,4C,4B,53,92,0D,0D,A9
 ,29,8D,76,24,A9,EF,8D,77,24,2D,59,07
 14
 1200 DATA 22,2D,4E,24,2D,7D,FF,0D,0D
 ,2D,2D,2D,2D,2D,2D,2D,12,41,4C,4C,04
 35
 1210 DATA 2D,4B,49,4C,4B,53,2D,41,52
 ,4B,2D,4E,4F,57,2D,5D,4E,4C,4F,43,05
 4D
 1220 DATA 4B,4B,44,92,9E,0D,0D,4C,06
 ,1E,A2,0D,86,FF,2D,3B,2B,A2,0D,2D,06
 BA
 1230 DATA C9,FF,A3,0D,8D,0D,0C,2D,02
 ,7F,EB,0D,FF,4C,0C,FF,2D,4C,2D,A2,0B
 18
 1240 DATA 0D,2D,06,FF,A2,0D,2D,CF,FF
 ,0D,0D,0C,EB,0D,FF,4C,0C,FF,2D,7D,0A
 BE
 1250 DATA FF,93,0D,2D,2D,2D,2D,2D,2D
 ,2D,2D,2D,2D,2D,2D,12,4C,4F,43,4B,04

5A
 1260 DATA 2D,4B,4E,54,49,52,4B,2D,44
 ,49,53,4B,92,0D,0D,0D,2D,57,23,2D,04
 F8
 1270 DATA 7D,FF,0D,0D,2D,2D,2D,2D,2D
 ,2D,12,44,49,53,4B,2D,49,53,2D,4E,04
 BD
 1280 DATA 4F,57,2D,57,53,49,54,4B,2D
 ,5D,52,4F,54,4B,43,54,4B,44,92,0D,05
 BA
 1290 DATA 0D,4C,06,1E,2D,7D,FF,93,0D
 ,2D,2D,2D,2D,2D,2D,2D,2D,2D,2D,04
 CC
 1300 DATA 12,5B,4E,4C,4F,43,4B,2D,4B
 ,4E,54,49,52,4B,2D,44,49,53,4B,92,05
 A2
 1310 DATA 0D,0D,0D,2D,8A,23,2D,7D,FF
 ,0D,0D,2D,2D,2D,12,44,49,53,4B,2D,04
 8A
 1320 DATA 49,53,2D,4E,4F,2D,4C,4F,4E
 ,47,4B,52,2D,57,52,49,54,49,2D,5D,05
 5B
 1330 DATA 52,4F,54,4B,4B,54,4B,44,92
 ,0D,0D,4C,06,1E,2D,7D,FF,93,0D,2D,06
 85
 1340 DATA 2D,2D,2D,2D,2D,2D,2D,2D,2D
 ,2D,2D,2D,2D,12,54,52,41,43,4B,2D,03
 41
 1350 DATA 41,2D,4B,49,4C,4B,92,0D,0D
 ,0D,A9,4B,8D,5B,27,A9,2B,8D,59,27,06
 09
 1360 DATA 2D,FA,36,0D,0D,AD,FF,29,8D
 ,A9,0B,8D,FA,29,8D,AA,0B,2D,3F,2D,09
 87
 1370 DATA 2D,F4,2B,2D,59,2D,CA,EB,ED
 ,1D,FD,36,8A,4B,2D,1B,29,AD,A9,0B,0B
 C4
 1380 DATA 0B,2D,EB,2D,2D,F0,92,2D,32
 ,29,AD,AA,0B,2D,EB,2D,A9,31,2D,4C,06
 68
 1390 DATA 2D,A2,0D,2D,C9,FF,2D,CF,FF
 ,8D,A9,0B,2D,CF,FF,8D,AA,0B,2D,0C,09
 FF
 1400 DATA FF,6B,AA,4C,94,2D,2D,E9,2D
 ,2D,59,22,A2,FF,4C,8A,26,2D,CC,FF,09
 63
 1410 DATA 2D,AA,2D,6B,A9,0D,0D,A7,0B
 ,2D,E9,2D,4C,06,1E,A9,0D,2C,A9,01,07
 0C
 1420 DATA 8D,AA,0B,A9,12,8D,A9,0B,6D
 ,2D,7D,FF,94,12,41,92,9E,2D,54,4F,09
 36
 1430 DATA 2D,41,42,4F,52,54,2D,2D,2D
 ,2D,2D,2D,2D,2D,2D,2D,2D,2D,2D,03
 38
 1440 DATA 2D,12,94,44,92,9E,2D,4B,4F
 ,52,2D,44,49,52,4B,4B,54,4F,52,59,06
 38
 1450 DATA 0D,0D,2D,59,32,C9,41,0D,09
 ,2D,CC,FF,2D,AA,2D,4C,EA,2D,C9,44,07
 B7

```

1460 DATA D0,17,A9,00,0D,A7,0B,A9,60
,8D,C9,1E,20,24,21,A9,A2,8D,C9,1E,08
70
1470 DATA 68,68,4C,00,00,A9,01,0D,A7
,0B,A2,0F,A9,A0,9D,AC,08,9D,09,29,07
22
1480 DATA CA,10,F7,20,7D,FF,0D,0D,43
,4E,54,45,52,20,46,49,4C,45,4E,41,06
04
1490 DATA 4D,45,0D,0D,0D,A2,00,20,CF
,FF,C9,6D,F0,58,9D,AC,0B,EB,ED,10,08
36
1500 DATA D0,F1,A9,00,03,0C,20,7C,20
,20,EF,20,A9,31,2D,4C,20,20,8F,22,07
A3
1510 DATA A5,FC,D0,35,AD,A9,0B,D0,EF
,2D,3F,29,2D,F4,28,2D,7D,FF,0D,0D,09
40
1520 DATA 96,20,20,20,20,20,20,20,20
,20,20,20,20,20,12,46,49,4C,45,20,03
60
1530 DATA 4E,4F,54,20,46,4F,55,4E,44
,11,9E,92,0D,00,4C,FA,28,A9,00,8D,04
7D
1540 DATA A7,0B,AA,60,A9,09,8D,7F,28
,A9,40,8D,8D,28,2D,7D,FF,93,0D,9E,08
9A
1550 DATA 2D,2D,2D,2D,2D,2D,2D,2D,2D
,2D,2D,2D,2D,2D,12,4C,4F,43,4B,2D,03
1B
1560 DATA 41,2D,46,49,4C,45,92,0D,0D
,0D,A9,EB,8D,58,27,A9,27,8D,59,27,08
A4
1570 DATA 2D,FA,28,D0,C3,20,6D,28,2D
,7D,FF,2D,49,53,2D,4E,4F,57,2D,4C,07
6D
1580 DATA 4F,43,4B,43,44,0D,00,4C,C6
,1E,A9,3D,8D,59,29,A5,FF,C9,64,9D,07
EC
1590 DATA 09,EB,64,03,FF,EE,59,29,D0
,F1,2D,AE,2D,6E,5A,29,8D,5D,29,A2,09
9D
1600 DATA 0F,2D,C9,FF,A2,03,8D,53,29
,2D,D2,FF,EB,ED,0A,D0,F5,4C,0C,FF,0B
7D
1610 DATA A9,31,8D,74,29,28,67,2D,2D
,2D,2D,A2,0D,2D,C9,FF,A5,FC,09,40,07
AF
1620 DATA 2D,D3,FF,2D,0C,FF,A9,32,8D
,74,29,2D,67,2D,2D,A4,2D,A9,0D,A1,08
CC
1630 DATA 2D,CA,2D,4C,F4,28,2D,7D,FF
,93,0D,9E,2D,2D,2D,2D,2D,2D,2D,2D,06
4C
1640 DATA 2D,2D,2D,2D,2D,13,55,4E,4C
,4F,43,4B,2D,41,2D,44,45,4C,45,92,04
B1
1650 DATA 0D,0D,0D,A9,29,8D,7F,28,A9
,8F,8D,8D,28,A9,9B,8D,58,27,A9,29,07
0E
1660 DATA 8D,59,27,2D,FA,28,D0,C2,2D
,6D,28,2D,7D,FF,2D,49,53,2D,4E,4F,07
89
1670 DATA 57,2D,55,4E,4C,4F,43,4B,45
,44,0D,0D,4C,C6,1E,A9,AC,85,07,8D,06
9A
1680 DATA 08,84,08,8D,8F,81,07,99,09
,29,86,1D,F8,2D,7D,FF,0D,0D,0D,0D,05
F5
1690 DATA 0D,0D,0D,0D,0D,0D,0D,0D,0D
,0D,0D,0D,0D,8D,2D,7D,FF,0D,2D,2D,02
49
1700 DATA 2D,2D,2D,2D,2D,2D,2D,2D,2D
,54,52,41,43,4B,2D,0D,6D,2D,7D,FF,04
B1
1710 DATA 2D,53,45,43,54,4F,52,2D,8D
,8D,2D,7D,FF,93,0D,12,9E,46,49,4C,06
37
1720 DATA 45,4E,41,4D,45,3A,2D,6D,6D
,43,2D,5D,2D,31,33,2D,5D,2D,2D,4D,04
6D
1730 DATA 2D,57,61,61,61,41,6D,4D,2D
,52,FA,62,03,4D,2D,52,9D,07,17,49,04
63
1740 DATA 2D,23,55,31,3A,31,33,2D,2D
,2D,2D,2D,2D,2D,2D,0F,58,52,57,4D,04
24
1750 DATA 3D,2B,44,4D,4C,55,4A,4B,54
,41,42,A3,2D,49,1F,5A,1F,CA,1F,3D,05
B4
1760 DATA 2D,F0,2D,23,21,6E,23,9A,25
,F0,25,A6,24,07,25,4A,26,E4,27,9A,06
E4
1770 DATA 2D,2D,7D,FF,44,45,4C,45,84
,45,44,2D,2D,0D,6D,2D,7D,FF,53,45,08
6F
1780 DATA 51,2D,2D,2D,2D,2D,2D,0D,6D
,2D,7D,FF,5D,52,4F,47,52,43,4D,2D,05
45
1790 DATA 2D,0D,6D,2D,7D,FF,55,53,43
,52,2D,2D,2D,2D,2D,0D,6D,2D,7D,FF,05
F7
1800 DATA 52,45,4C,41,54,49,56,45,2D
,8D,6D,AE,8C,CA,D8,0D,0D,0D,0D,0D,05
EB
1810 DATA END
63995 PRINT "(CLR)";COLOR0,1;COLOR4,1
:CHAR1,10,12,"(YEL)WORKING...";1,C
HAR1,14,14,"PLEASE WAIT";1,RESTORE
63996 READA$=B-DEC(AR):B=B-DO:READB$
:IFB$="END"THENEXIT
63997 SU=0:FORJ=0TO19:B=DEC(BB):POKE
E+J,B:SU=SU+B:CHAR1,22,12,HEX$(E+J)+
"-"+BB,1
63998 READB$:NEXT:B=B+20:[PUSH]DEC(B
B)THENPRINT"(CLR)(CLR)(DOWN)(DOWN)(D
OWN)(DOWN)(LRED)DATA ERROR IN LINE"
PEEK(65)+256*PEEK(66):END
63999 LOOP:INPUT"(CLR)(DOWN)(DOWN)(D
OWN)(DOWN)(DOWN)FILENAME OF TA
BSET FILE":N$=B$AVE(N$),20,P(5)TOP1
E1:END

```


Scratchpad

Eric Doyle presents a selection of your routines.

While delving through my box of routines I came across this one from one of our many Australian readers. This particular Wizard of Oz is **Anthony Garrett of Capel, Western Australia**, and he has conjured up a routine which will make a filled program reappear as if by magic. Obviously, its all entered in direct mode on any C64:

```
POKE 2600,0
SOS 4000
POKE 45,PEEK(104)
POKE 46,PEEK(175)
POKE 47,PEEK(104)
POKE 48,PEEK(175)
POKE 49,PEEK(104)
POKE 50,PEEK(175)
CLR
```

When NEW entered two zero bytes are placed in the first two program memory locations. These normally tell the computer where to find the next line but two zero bytes say "that's your lot, pal". All programs end with two zeros and the LIST and RUN commands react by leaping back to the familiar READY message above a flashing cursor. Naturally enough, if zeros are the first bytes these routines react as they assume there's nothing worth reading and switch off straight away.

The first line gives a value to one of these bytes. It's not the correct value so the second line jumps to the SOS routine which rechains the lines. This is one of the clever little routines which the Operating System uses when you add a line to the middle of an existing program. The effect is that the first two bytes are changed to their correct values so the program is all there now.

Unfortunately, someone's told the rest of the computer, so it still won't run yet. This is where the other lines come in. Locations 104 and 175 now point to the end of the program but we have to make sure that locations 45 to 50 know this by poking the values in.

PROGRAM: SLOW PRINT

```
10 REM SLOW PRINT
20 AA="THIS STRING HOLDS YOU
3 MESSAGE"
30 LD=LIN(148):A=(40-42)/300
40 PRINT*MSG:(DOWN)(DOWN):
DOWN=(DOWN)(DOWN)*148:
50 POKEA TO A
60 PRINT PEEK(A,1)
70 FOR B=0 TO 100NEXT B
80 IF D=0 THEN 140
90 PRINT*MSG:(DOWN)(DOWN):
DOWN=(DOWN)(DOWN)*148:
100 FOR B=1 TO 10
110 PRINT PEEK(A,B,1)
120 FOR B=1 TO 100NEXT B
130 PRINT*MSG:*(D=1)GOTO
40
140 END
```

PROGRAM: SCROLL

```
10 REM SCROLL STRINGS LEFT
20 LL=15
30 AA=" INSERT
YOUR MESSAGE HERE..."
40 AA=AA*UP TO 255 (MAXLINE)
50...
50 LD=LIN(148):A=(40-41)/3
60 FOR A=0 TO 10
70 PRINT*MSG:(DOWN)(DOWN):
DOWN=(DOWN)(DOWN)*148:
80 PRINT PEEK(A,1)
90 FOR C=175:GOTO 148
A,A
```

Even now they're still not quite correct but a simple C64 command sets them out properly. In vails, back comes the old program.

Baring the basic for a while, **B B Night of William Sanyon**, has two string handling routines to give your title pages a bit of pizzazz.

In both routines (L is the length of the string and I calculates a TAB value to which it is at the centre of the screen. Beyond that, my lips are sealed. If you want to know what happens you'll have to try them for yourself.

Scratchline is famous for poetry and Steve Kimberley, who is well known to someone who likes pottering about with C-64s to produce programs such as Cyborg. He writes, to give everyone the benefit of his experience:

"A listing is useful for debugging or producing a hard copy of some code. This program will allow the user to send monitor-style or disassembled code to a printer. Save the program and then run it. Specify A or G with the start and finish of your code and it will print the desired sections."

PROGRAM: PROTECTOR

```
100 INPUT"PLEASE ENTER YOUR
NAME";NM
110 NM=CHR$(187)*"DOOR" *M
NM+*, I CAN'T DO THAT,"
120 FOR D=0 TO LIN(NM)
130 POKE100+D,ASC PEEK(NM)
A,131
140 NEXT
150 POKEDOR*(10,0
160 FOR D=4224 TO 4230
170 READ A:POKE 1,A:GOTO
180 GOTO 4234
190 DATA 149,131,141,6,3,149
,132,141
200 DATA 7,3,149,149,149,
170,132,30
210 DATA 170,76,116,104,0,0,
0,0,0
220 DATA 149,34,141,6,3,149,
147,141,7,3,149
```


FROGG

PROGRAM: SCREEN DATA

```

START- 34574
NO. BYTES- 1034
24576 : 2020202020202020 CH : 256
24584 : 2020202020202020 CH : 256
24592 : 2020202020202020 CH : 256
24600 : 2020202020202020 CH : 256
24608 : 2020202020202020 CH : 256
24616 : 2020202020202020 CH : 256
24624 : 2020202020202020 CH : 256
24632 : 2020202020202020 CH : 256
24640 : 2020202020202020 CH : 256
24648 : 2020202020202020 CH : 256
24656 : 2020202020202020 CH : 256
24664 : 2020202020202020 CH : 256
24672 : 2020202020202020 CH : 256
24680 : 2020202020202020 CH : 256
24688 : 2020202020202020 CH : 256
24696 : 2020202020202020 CH : 1642
24704 : 2020202020202020 CH : 1048
24712 : 2020202020202020 CH : 1040
24720 : 2020202020202020 CH : 1040
24728 : 2020202020202020 CH : 1048
24736 : 2020202020202020 CH : 652
24744 : 2020202020202020 CH : 256
24752 : 2020202020202020 CH : 256
24760 : 2020202020202020 CH : 256
24768 : 2020202020202020 CH : 454
24776 : 2020202020202020 CH : 652
24784 : 2020202020202020 CH : 256
24792 : 2020202020202020 CH : 256
24800 : 2020202020202020 CH : 256
24808 : 2020202020202020 CH : 454
24816 : 2020202020202020 CH : 1048
24824 : 2020202020202020 CH : 1246
24832 : 2020202020202020 CH : 850
24840 : 2020202020202020 CH : 850
24848 : 2020202020202020 CH : 652
24856 : 2020202020202020 CH : 652
24864 : 2020202020202020 CH : 850
24872 : 2020202020202020 CH : 850
24880 : 2020202020202020 CH : 850
24888 : 2020202020202020 CH : 652
24896 : 2020202020202020 CH : 652
24904 : 2020202020202020 CH : 850
24912 : 2020202020202020 CH : 652
24920 : 2020202020202020 CH : 652
24928 : 2020202020202020 CH : 454
24936 : 2020202020202020 CH : 652
24944 : 2020202020202020 CH : 850
24952 : 2020202020202020 CH : 850
24960 : 2020202020202020 CH : 850
24968 : 2020202020202020 CH : 454
24976 : 2020202020202020 CH : 652
24984 : 2020202020202020 CH : 850
24992 : 2020202020202020 CH : 1048
25000 : 2020202020202020 CH : 1048
25008 : 2020202020202020 CH : 454
25016 : 2020202020202020 CH : 850
25024 : 2020202020202020 CH : 256
25032 : 2020202020202020 CH : 256
25040 : 2020202020202020 CH : 256
25048 : 2020202020202020 CH : 454
25056 : 2020202020202020 CH : 256
25064 : 2020202020202020 CH : 256
25072 : 2020202020202020 CH : 256
25080 : 2020202020202020 CH : 256
25088 : 2020202020202020 CH : 256
25096 : 2020202020202020 CH : 1042
25104 : 2020202020202020 CH : 1040
25112 : 2020202020202020 CH : 1040
25120 : 2020202020202020 CH : 1040
25128 : 2020202020202020 CH : 850
25136 : 2020202020202020 CH : 256
25144 : 2020202020202020 CH : 256
25152 : 2020202020202020 CH : 256
25160 : 2020202020202020 CH : 256
25168 : 2020202020202020 CH : 256
25176 : 2020202020202020 CH : 256
25184 : 2020202020202020 CH : 256
25192 : 2020202020202020 CH : 256
25200 : 2020202020202020 CH : 256
25208 : 2020202020202020 CH : 256
25216 : 2020202020202020 CH : 256
25224 : 1012051313200609 CH : 124
25232 : 120520140F201314 CH : 161
25240 : 0112142020202020 CH : 129
25248 : 2020202020202020 CH : 256

```



THE MONTHS ARTICLE IS the final one in the series (all together — Aah! no! I shall finish off by adding a title screen. The data should be typed in using the entry routine provided in the first article (from *Commodore*, January '86). The start address is 34576 and the number of bytes is 1824. Save it under the name of "FROGMACRO".

The short piece of code simply sets the background colour to black, sets all character squares to blue foreground and transfers the data from \$6000 to \$6400 (the video matrix). Finally JOYREAD is called to get for a depression of the firebutton. That's it!

Enjoy yourself, and watch out for menacing Frochomps!

Daryl Bowers

completes his

arcade series.

```
25256 : 2020202020202020 CH : 256
25264 : 2000202020202020 CH : 256
25272 : 2020202020202020 CH : 256
25280 : 2020202020202020 CH : 256
25288 : 2020202020202020 CH : 256
25296 : 2020202020202020 CH : 256
25304 : 2020202020202020 CH : 256
25312 : 2020202020202020 CH : 256
25320 : 2020202020202020 CH : 256
25328 : 2020202020202020 CH : 256
25336 : 2020202020202020 CH : 256
25344 : 2020202020202020 CH : 256
25352 : 2020202020202020 CH : 256
25360 : 2020202020202020 CH : 256
25368 : 2020202020202020 CH : 256
25376 : 202020202192004 CH : 191
25384 : 0112190C20020F17 CH : 128
25392 : 051213204E323034 CH : 275
25400 : 4045303531323133 CH : 438
25408 : 3230343430353132 CH : 402
25416 : 3133323030303531 CH : 396
25424 : 3231333232303531 CH : 400
25432 : 3231333330353132 CH : 401
25440 : 3131303531323230 CH : 394
25448 : 3531313035353030 CH : 401
25456 : 3031313231303043 CH : 417
25464 : 3230303230463137 CH : 418
25472 : 3730313132313530 CH : 405
25480 : 4032303032304631 CH : 430
25488 : 3130313132313530 CH : 399
25496 : 4332303032304640 CH : 451
25504 : 3031313231303043 CH : 417
25512 : 3230303230303031 CH : 389
25520 : 3132313030433230 CH : 410
25528 : 3032323031313231 CH : 393
25536 : 3930433230303030 CH : 414
25544 : 3131323130304332 CH : 419
25552 : 3030303131303139 CH : 398
25560 : 3043323230303131 CH : 411
25568 : 313930434303131 CH : 434
25576 : 3231303030303131 CH : 398
25584 : 3231303030303131 CH : 409
25592 : 3131303131323230 CH : 392
```

READY.

```
2000 : JSR TITLE
11000 : FINAL
11010 : JSR WAIT3
11020 : JSR RVAR0
11030 : JSR INIT
11040 : RTS
:

14510 : TITLE
14520 : STA $DC21
14530 : LDA #0
14540 : LDY #0
14550 : COLLOOP
14560 : STA $D900.Y
14570 : STA $D900.Y
14580 : STA $DA00.Y
14590 : STA $DAF0.Y
14600 : DEY
14610 : BNE COLLOOP
:
14620 : LDY #0
14630 :
14640 : NXLOOP
14650 : LDA $D000.Y
14660 : STA $D400.Y
14670 : LDA $D100.Y
14680 : STA $D500.Y
14690 : LDA $D600.Y
14700 : STA $D600.Y
14710 : LDA $D2F0.Y
14720 : STA $D6F0.Y
14730 : DEY
14740 : BNE NXLOOP
14750 : MECHN
14760 : JSR JOYREAD
14770 : BCS MECHN
14780 : RTS
14790 :
14800 : FINISH
14810 : END
```

WORDAHOLIC

really has to be the bargain of the year.



SuperScript

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...therefore the possibilities are endless...
...it is a huge time worth the most
...wordshape in for columns and
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...very satisfactory...remains easy and a t
...SuperScript is an obvious choice, with near
...strong definition with surprisingly easy to
...his feature makes it a very popular word pr
...Excellent performance, simple to use it...
...Were satisfied, used for the letter writer a

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Abstract

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POLYMER LETTERS, Vol. 8, No. 10, pp. 697-700 (1970)

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WEDNESDAY, APRIL 22, 1992



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1. *Journal of the American Medical Association*, 2000; 283: 2689-2695.
 2. *Journal of the American Medical Association*, 2000; 283: 2696-2703.
 3. *Journal of the American Medical Association*, 2000; 283: 2704-2711.



1000

EXHIBITIONism

IT'S NOT OFTEN THAT THE COMPUTER Press gets excited, but the official launch of the Amiga was an event not to be missed. For once the lure of a Champagne Breakfast wasn't the main attraction and the buzz—which was going around wasn't the sound of all-night copywriters crashing up on their sleep.

We were shepherded past Ulamasoff's stand into the Commodore Theatre and the tension mounted. At last the gods would descend and reveal to us more mortals the price of their great miracle. Fear, since Moore was given the Tablets of Stone had words been availed with such great expectation.

Enter the Amiga

The reality was about as exciting as Moore disclosing a note to his milkman. With such a revolutionary piece of hardware one would have anticipated demos galore, flashing lights and inspirational music. All we got was Chris Searby, a slide show and the intrusive strains of music for Psychodelia from the Ulamasoff stand.

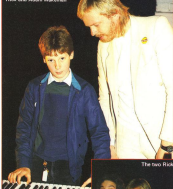
Admittedly, the slide show was produced by projected images from an Amiga which were, in their way, impressive but they merely gave a hint at the capabilities of the machine. No Amiga ball this time just images to help the pep talk along. Oh yes, and the price. Any dreams of a sale £1000 (price tag some soon shattered) (if any such romantic dreams were still with us). The stark reality is £1425 + VAT with a single disk drive, which means £375 change from £1700 for the more modest machine and £1825 + VAT for the twin drive version.

Music Sales' demonstration of the new Music Expansion System under the magic touch of megastar Rick Wakeman was far more impressive, but none of this last.

Outside the theatre the show was coming to life like some great monster stirring itself after a year of hibernation. Another shock-front story was waiting to unfold. Where were the big boys. Sir Colin and Ariolasoft? I mean no disrespect to Bubble Blue, Ulamasoff, Miramax, Martech, Anso, Tymocall and Level 9 who all made the effort to meet the people they serve so well, but the major games publishers were noticeable by their absence. Where were they all?

At least there was plenty for the gaudier in the bargain basement. At times it seemed more like a Middle Eastern bazaar than an exhibition, with milling crowds and cigarette coffee, Pan

Rick and Anders Wakeman



Eric Doyle takes a sidelong

look at the Seventh

Commodore Show.

The venue: Successful Harrodsman's
The date: Friday, 9th May 1986
The venue: The Seventh Commodore Show
The time: 5.30pm
The event: The Official Amiga Launch

that we saw much of a throng on Saturday with the FA Cup's inevitable attractions keeping the attendance down. In contrast, Sunday was like the good old days of computer mania, frenzy and morning.

Upstairs the scene was beginning to look like the Commodore Pet Shows of yore with the principal commodity being business software for the 64, 128 and Amiga.

The two Rocks



Reactions

The optimistically named Amiga Village was a special area set aside to display the Amiga and its works in all their glory. The new machine was put through its paces for interested groups of visitors but once again the enormous potential of the machine seemed to be trivialised, unless the sight of flying hotdogs turns on you one.

The Amiga is a bit of an enigma at the moment. Its undoubted graphics capabilities and speed make it an extremely desirable acquisition for computer buffs, but how will the business community react. With the long shadow of IBM being cast across the marketplace I wonder if the Amiga's glow will shine brightly enough in the dark.

The general view of showgoers was that the Amiga will be a very strong contender in the area of Computer Aided Design, video graphics generation or even in the publishing world but I've yet to hear a convincing argument for it in the business world. Certainly the software on display failed to take my breath away. Commodore hopes that I'm wrong and would rather see IBM's lengthening shadow as a sign that the sun will soon be setting on its empire, branding the spirits of Commodore as a force in industry. Only time will tell if it's a case of welcome back CIB for sales Amiga.

Classics

The most impressive array of hardware was displayed by Vixta Software. No other company managed to create the impression of total support for the Commodore range. Kelvin Lacey of Vixta was not backward in expressing his surprise that CIBM was giving the impression of being a one machine company.

On the Vixta stand, were displayed the full range PCs, IBM and lots to show the power of the software. Particularly impressive was the K128 Vixta Classic Cartridge which must surely be the Rolls Royce of wordprocessors. The cartridge gives instant access to the full power of the program plus the advantage of an 80 column display. Sophistication comes at a price, however, and in this case it is £99.95.

Get Smart

Next door to Vixta was a rather featureless looking area labelled Micropro International. Covering the same area as its neighbours, the stand looked empty because no display equipment had arrived. For the full weekend the staff busied frantically to make their presence felt amongst the empty drinks cans and other detritus which their wide open spaces seemed to attract. The new product was equally as small as their display area but its significance is enormous. For the first time a Smart Card was being shown running a program on the £64K 528.

Smart Cards look like normal credit cards but hidden within their plastic exterior is a small but powerful microchip. Micropro's application was the extremely popular Superbridge wordprocessor which simply slots into an adaptor in the cartridge part of the computer. This gives instant access to the user at a relatively modest cost of around £85.



To be Precise

SuperScript is a product from the Precision Software range, the full strength of which was being demonstrated next to the Amiga Village. In all honesty the demonstration of the precision Amiga graphics packages upstaged the official demonstration and visitors to the show squandered in to the small display area to marvel at the wonders on display.

SuperScript and its comparison program Superbase have now been combined in the 128 so that both programs can run concurrently and exchange information for mailing list applications, making a very powerful business tool for the small businessman. For those who are still struggling with Superbase, help is at hand with the publication of Superbase. The book and for those who have given up there is the simpler Superbase Starter.

US Influence

The appearance of the Amiga has attracted one or two Stateside companies to test the water over here. Timesworks is

one such company which was particularly eager to show US business software. JetBook, World Writer and Data Manager will all be appearing during these summer months. I am particularly eager to see the Timesworks Sideways program in operation. This is a spreadsheet utility which prints text along the length of printer paper instead of across the width, saving a lot of the time which collating and pasting together printed sheets normally involves.

And Turn Power

The only true software launch at the show was a utility cartridge from Power Products which is a Danish company marketing its products through the auspices of Peter Warr's Rainbird company in this country. The Power Cartridge has an impressive array of facilities not least of which is the fact that it employs its own external memory and is transparent to the computer. This means that it does not use a large chunk of memory which could be better used for programming.



Bizarre bazaar bargains

When the going gets tough...



The cartridge offers programming toolkit commands to *64 Basic*, video tape and disk commands, low and high resolution screen dumps and a machine code monitor.

At long last cartridges seem to be coming into vogue for the 64 and a lot of this attention was heaped back to Germany and Holland. Robtek markets Dutch cartridges amongst its range of products. The Robtek 58 Cartridge fairly inverts the cartridge pan as my 64 and the Game Killer cartridge is proving to be phenomenally successful amongst the game playing fraternity. Paul Shaw of Robtek is not slow to point out that the company is not short of ideas for the future. The latest product is a disk maintenance kit which should help prevent the need for costly repairs.

Bright Ideas

My own award for technical innovation at the show must go to Overbass. Bob Glynn revealed his *Thing!* to the general public and everyone agreed that they'd never seen anything like it. Everyone wanted one. For around £7 you too can have a *Thing!* just like his. What is it? When I tell you you'll kick yourself for not thinking of the idea yourself.

The best way to describe it is that it is a kind of building clip on a strong plastic arm which attaches to the top of your monitor. The clip will hold a listing or a piece of text which you want to type into your computer. Holding the clip up by your monitor means that eye movement is kept to a minimum and hopefully reduces the strain of constantly looking back and forth from copy to screen. Simple but very effective, the *Thing!* proved very popular at the show and has the distinction of being compatible with any make of computer!

An alternative use for the *Thing!* is to clip a picture of your sweetheart or spouse (or both) to it so that you don't forget what they look like!

Opinions

Although some of the big companies weren't there, PC men aren't complaining. The boys like piglets round a cow's teats. Grunting and squeaking about their companies later, 'blackbustery' it gave hope for the games market but I felt there was an air of desperation in their cries. There is no doubt that games sales generally are not what they used to be.

One little ray of sunshine in this impending gloom was Mike 'Two in the Bush' Baxter of Televisions, once described as the most eligible bachelor in PC and idly disparagingly trying to prove it. He is the voice of hope about his says that the full potential of the games market is not being fully realised because the games market lacks genuine innovation. I would tend to agree with this having seen so many 'cloned' games of late.

And the Sheep

One innovator who has been very quiet of late is the unquenchable Jeff Minter. His new game, *Irish Alpha*, is still under development but the demo he had running looks very interesting, demonstrating yet another facet of mirror image lateral screen splitting which he pioneered with *Sheep in Space*.

Keyed Up

Within sight (and unfortunately sound) of Diamond was the Commodore Theatre, aforementioned site of the damp squid Amiga launch. During the show several companies used this as a venue to give full blown demonstrations of products, but none more effectively

than Music Sales. Using Rick Wakeman and Rick Cardinalli as demonstrators, the full potential of the AM music system was realised.

Once more Chris Kayday was called upon to act as Master of Ceremonies and his performance was quite a contrast to his appearance at the game launch. Life and soul of the party Chris bounced on to the stage and in his first event-of-the-show-style announced the two Ricks.

The staging could have been better staged by involving extensive views of Wakeman's rear and but the magic was magic. Now ageing gracefully, Rick Wakeman has allowed himself of the long-haired, capped keyboard crusader look of his days with Yes and now merely looks rich. Rick Cardinalli, in contrast, is more flamboyant and less rich. Dressed in a style which he self-confessedly describes as 'like the Penguin in *Barman*', it's a pity that Wakeman no longer employs a cage in his act.

Wakeman and Cardinalli make a highly entertaining double act being both talented and witty. The audience sat open-mouthed as Wakeman worked his magic on the tones of the Music System while Cardinalli showed the equally impressive powers of Music Sales Sound Sampler. Even Wakeman's son, Adam, got a look in and left us all wondering if he'd follow in his father's footsteps in future years.

The price de resistance of the show was a Commodore tap in which Cardinalli directed his voice through the sampler to give a rich, deep 'bark' sound and then turned up the pure to make it sound like a Donald Duck rap.

This performance stole the show for me, it overshadowed the Amiga demonstrations and even distracted my chauvinistic eyes from the inevitable flurry of beautiful assistants at the stalls.

Overall Impressions

The Show Guide reflected my total impression of the Show itself. It concentrated on the Amiga and the Music System with an old recycled review of the 128. Apart from that and the ads, it had nothing more to say. All in all, it was like an extra edition of a certain magazine.

This time the attendance indicated an upturn in the fortunes of the computer trade but the games field failed to reflect this hope by several noticeable non-appearances. The attitude of the show given was summed up by one youth, obviously suffering the onset of adolescence. He took a long look at the leggy blonde handing out the Show catalogues and was heard to exclaim, 'Car, look at the legs on that'. To this his blond replied, 'Never mind those we came to look at computers!'. Such single-minded dedication should have been rewarded with a better showing from the industry.

Runecaster leads you into
the dark and complex world
of adventures.

THOUSANDS OF ADVENTURERS who get their teeth on the Hobbit will probably already have got their copy of 'The Lord of the Rings'.

When it is introduced, 'The Hobbit' set new standards for adventure games. Is this long-awaited sequel from Melbourne House going to shine as brightly?

The suspense of waiting has finally given way to an awed feeling of anticipation at the size of the program and the way the main characters can interact. This is only part one of a three part trilogy, with the second and third parts still a long way off. The original story was published as three books and the computer game versions will follow this pattern. The first, based on book one, is entitled *The Fellowship of the Ring*.

The program comes on two cassettes which contain a cut-down beginner's game in addition to the two separate parts of the main adventure. Also included in the package is the 180-plus page book the first part of the trilogy together with an excellent instruction booklet.

The beginner's game is well presented and should prove a good introduction to adventure gaming. Its responses to the input 'HELP' are fairly direct and give the newcomer a good idea of what adventures are all about. The main adventures do not recognise this command.

Although listed in some quarters as a graphics adventure, very few pictures are used in the main game, most appearing in the beginner's version. What graphics there are, are not very inspiring and in no way create the atmosphere found in *The Hobbit*.

When starting the game you will be asked which of the four hobbits — Frodo, Sam, Pippin or Merry — you wish to control. You may choose one or more but whilst playing one character, the others will generally follow the leader unless specifically told to do otherwise.

The screen display resembles a stack of four sheets of paper slightly displaced, so that in addition to the top page, a little of the left hand side of the three other sheets may also be seen. Pictures of characters at your present location are shown at the left on the top sheet. Main characters elsewhere are shown on the three sheets underneath.

The game has many of the ingredients of the original book. Players who have read *The Fellowship of the Ring* will often have a feeling of déjà-vu. Reading the book is recommended as this game follows the story more closely than *The Hobbit* game did. Far from spoiling the adventure, this adds to the pleasure for *Lord of the Rings* fans and



there are still plenty of puzzles to be solved.

There are plenty of locations to explore which contain nothing of special importance in solving the game but which add a lot to the general atmosphere. This greatly increases the feeling of a role playing game.

There is much to command in Melbourne House's latest epic, sadly there is a darker side to the coin too. Program operation is desperately slow, there are a number of fatal bugs that will cause the program to crash and some of the responses to input commands are ludicrous to say the least.

Nearly all actions result in a fair amount of text being displayed. This takes some time to appear, no doubt partially due to the program also working out what the various independent characters are doing at that time. More Frodo to a new location and the three other hobbits, together with any other companions, will follow

him in their own good time!

Half a minute between moves is good going, sometimes over a minute is required to regain control of the input cursor to enter your next command! The program will crash if you go into a dark place without matches to light your way and I've heard reports of other situations that give a similar result.

Such is the complexity of the game that it is not possible to QUIT and just start from the beginning — you must reload the program from scratch. This can be onerous to some extent by frequent SAVINGS of your game position on a separate data tape but again this process does tend to slow the game play somewhat.

Complex input commands are accepted, as is talking to other characters (a necessity on occasions). With such a complicated parser it is perhaps not surprising that some strange responses are produced but it can be a bit annoying when an item passed from

one hobbit to another is lost in the process!

For all its faults *The Lord of the Rings* is a marvellous game for anyone with the blood of Middle Earth in their veins. Nevertheless to this wonderful world may well disappear but those of us who have waited for further hobbit trash from the Shire will sit back and enjoy the experience.

Americana

Although there have been some notable releases of adventure games from UK writers, in the last few months, the continuing trickle of American imports is most welcome. Activision's release of the cassette version of *Blackthorn* seems to have made other software houses aware of the gains to be made by having games available on something other than disk.

US Gold has recently launched an updated version of an old favourite on both disk and cassette for the C64/128 — *Ayrlim*. This gained popularity some years ago as a crude, but successful, graphics adventure for the TRS 80 as *Ayrlim I*. It was followed by a slightly easier version *Ayrlim II* but with basically the same plot.

This new version seems to be an improved version of *Ayrlim I*, with good graphics and a very devious 3-D maze of corridors and rooms that you must map (with difficulty) to explore. Traps are everywhere though the one and only coin available to you.

The theme is that you have been 'put away' after being found wandering the streets muttering such phrases as "Take the book and drop the castle" and "May the dragon with the sword". Sounds familiar doesn't it?

The door to your room has been inadvertently left unlocked and you must try to find a way to escape. Opening up as a doctor seems to be the recommended method but first you must find the necessary objects to give your diagnosis authority.

Down to other rooms will be locked but electronic keys can be found to unlock them. Having opened and examined the contents of those rooms, you must remember to close the doors behind you — too many doors left open will set off the alarm!

If my memory serves me correctly the original *Ayrlim I* had random alarms connected to some door that this version has not yet caught on that way! On entering a room, you may find a box containing something useful — pick it up and the box disappears, put it down and it reappears in its box!

You may also hide things under the furniture but remember where you put them because there will be no indication of their hiding place once you've set them down. The vocabulary is extensive and may be reviewed at any time by pressing function key F1. Key F2 will present a 'slide show' of some of the

pictures you may find on your travels.

Input commands recognised are fairly comprehensive allowing such as: "DO OPEN THIS THING (EXCEPT THE RED COSTUME)", "TRADE COINS FOR PINEAPPLES AND", "GET MAGNET, ENHANCE MINE CARD". Several commonly used words are recognised by their initial letters, which saves a great deal of typing. "DO DOWN CARD" is a lot quicker than typing "DO OPEN DOWN WITH CARD".

The graphics are good home pictures and are at their best when you enter special rooms or meet various characters in the corridors. You may move around the corridors by using the cursor keys for turning left or right and the up/down key for moving forwards. I assume everything, you never know what is where anything useful may be hidden but never "LOOK UP", true to the original version, something unexpected may fall on your head!

It certainly looks as though this program has been given a new lease of life. US Gold should be congratulated on this 'resurrection program' for marketing greatly improved versions of some of the home computer's classic games: *The Temple of Apshai* trilogy and now *Ayrlim*. What next?



Team Play

Fancy a multiplayer adventure game? *The Causes of Chaos* from ORL offers the opportunity of a six player game. You can either band together or wage war on each other as the model takes you. Working in unison seems the way to go, as otherwise someone will have to sit there with their eyes shut!

The game is a fairly basic text only adventure, with the aim being to find six stolen royal treasures. At the beginning you must enter how many are to play, their names and how many turns each is allowed (one to nine). The input

command is of the type verb/noun and the game does not appear to have a very large vocabulary.

If another player is present you may attack him/her/fart! The outcome of each 'round' is determined by who possesses a key first and their present status — weapons skill, hit points remaining etc. A reasonable system but not exactly kind to your computer's numeric keys!

The game is a little difficult to get into with only a few locations accessible at the start. Location descriptions are brief and the exits vary slightly if the same player game has been chosen! There are a series of help messages but generally the text is a little thin.

ORL has a good reputation for software but the *Causes of Chaos* is below normal standard and is certainly not going to get into any top ten.

Last of a Line

Taitken has produced some good arcade games in the past few years and now this company has launched its first adventure look of *Darkon*. It is also the last game as Taitken has gone the way of many promising software houses and no longer exists but this game is still available.

Sons of Darkon is a text and graphics adventure which players will love to hate. Yes one of those! It has a fairly standard plot, where you, the hero, will hopefully free the world from its evil overlord Darkon. The world is the planet Mergon, you are 'biotic' and are accompanied by a robot called Kompar!

There is a strange mixture of ancient and modern with anti-gravity belts as well as swords and magic. Make the most of what you can find, for there are plenty of things hidden in this game, over 15 possibly useful objects in the first 10 locations!

There is a text panel at the top of the screen that describes your immediate surroundings — but not what may be lying around for you to pick up. Hence, the screen is split, with a three to four picture on the left and on the right a scrolling text window that displays the replies to your input commands.

Multi-word commands of the type "ATTACK THE MAN WITH THE MACE" are accepted but the vocabulary is limited. "DO AIR" or "V" will display a list of the verbs that are understood and this will often be scanned in the hope of finding the right word.

You are not always told what you might have discovered, frequent use of "LOOK" is to be recommended. HELP is recognised by the game and does not bring any immediate assistance but "UGOD" will produce various useful but cryptic messages.

Each step seems to involve a puzzle and you may feel that some of these are somewhat contrived. There are characters to meet but the vocabulary limits any great interaction! Definitely

not a game for the novice adventurer as progress is restricted to very few locations until a number of puzzles have been solved.

Communicate

Playing adventures may not be the most popular use for a home computer but it certainly has a following that is both large and growing. There are adventure columns in nearly every magazine and a growing number of independent, privately produced, dedicated adventure mags.

The independents are usually photocopied affairs, crisscrossed with news, views and reviews. You may think that with so many people all looking at the same source material that they would all be reporting the same things about the same games — not so. Each reviewer has his own ideas as to what makes a game a winner or a loser.

Some games stand out from the pack, while others fall by the wayside completely. Fortunately the latter are getting fewer. But although the appeal of adventures is widespread, not everybody likes to play the same type of game. The trick is to find the reviewer who has a similar taste to yourself.

Adventure columns should be as impartial as possible with a good reviewer having spent a fair time trying to solve the adventures he reviews. We

are not super-heroes, able to solve every game in just a few hours but we do have the experience of dozens of adventures to draw upon. The more you read, the more likely you are to be able to judge which games are for you.

One of the newer independents is 'Overlander', edited by Nick Walkland of 84 Kendal Road, Sheffield S18 2P4. A single issue is 50p or a year's subscription, £1.00. Our sample had some 30 pages of info, maps, letters and general funnle — not bad for 50p.

The best known independent is probably that of the Adventurers Club Ltd, 84C, Morden Road, London NW9 3BH. This is a monthly 30 page dossier, costs £10.95 yearly and is a more professional set up linked with discounted software, a phone-in help line, competitions and various other offers. The Adventurers Club is run by dedicated adventurers, they know what you want and aim to supply it.

The less formal approach of these independent mags, tend to encourage a good response from readers but more here there is a delay between the writing of a question or answer and its publication. Phone-in help lines are one answer but an even more exciting development is becoming more and more popular with computer users — electronic mail, bulletin boards and special interest groups.

All these and more, are the outcome of linking your computer via a modem to many of the free networks set up around the country. Modems are becoming cheaper and often come with a list of phone numbers that will give you access to several of these bulletin boards.

There are many topics covered, ranging from where to get to alternative modems! Quite a few have adventure clubs and/or the facility to leave messages requesting help. Another aspect of this form of communication is access to adventure games themselves, where the program can be downloaded directly into your own computer.

For some networks, you have to pay a regular subscription but there are usually some features that make this worthwhile. Buy a Commodore modem and you will probably also get a limited free-rob to Compuserve. They offer all the usual bulletin board facilities plus much more.

There are even a number of well known games (Level Nine for instance), available for downloading from Compuserve at less than the normal retail price. These have the added advantage of being disk based even if those in the shops were only on cassette. Having once got a modem there may even be the temptation to join in some real-time adventures with other modem users.

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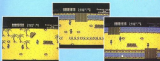
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